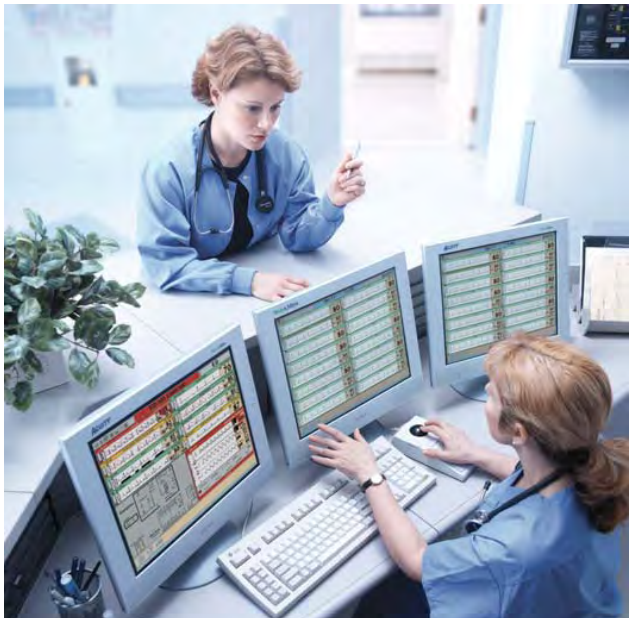
Acuity® and Mobile Acuity LT Central Monitoring Systems



Directions for use

Software version 8.1x

Welch Allyn®

Advancing Frontline Care™

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CE 0297

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1 General information

Intended use

The Acuity Central Monitoring System (Acuity System) is Welch Allyn's central monitoring solution. It consists of a central monitoring station, Acuity System software and a collection of other commercially available networking products.

The Acuity System is intended for use by clinicians for the central monitoring of neonatal, pediatric and adult patients in health care facilities. The system connects to a network of patient monitors to record and analyze physiological data being acquired by the monitors. This solution leverages networking and connectivity to obtain and distribute patient information where and when needed. The overall performance of the networked system is based upon trending and data management techniques consistent with industry practice and applicable standards.

The Acuity System is available in multiple product configurations. Acuity Systems can be ordered off-the-shelf or customized to meet a customer's unique needs based on hospital policy, health care facility size and patient. In all cases, the user must carefully review the features and functionality of the Acuity System to ensure that selected configurations meet specific clinical needs.

The Acuity System supports patient information management, patient vital-sign alarm and equipment alert management, patient data and waveform monitoring and review, system administration and ongoing service. Acuity System software modules and devices support adult, pediatric and neonatal patients, except where indicated below. Acuity System software can include the following optional modules:

- The Full Disclosure module stores patient data for up to 96 hours.
- The Arrhythmia Analysis module provides real-time monitoring and alarms for specific changes in cardiac rhythms. The clinician is responsible for determining the clinical significance of each detected arrhythmia event or alarm. The Arrhythmia Analysis module is *not* intended for use with neonatal patients.

- The ST Analysis module provides real-time monitoring and alarms for ST-segment deviations for patients with suspected heart disease and anomalies. The clinician is responsible for determining the clinical significance of each selected ST-segment deviation or alarm. The ST Analysis option is *not* intended for use with neonatal patients.
- The Welch Allyn Connectivity Server (WACS) module consists of a server platform on which one or more of the following software options are installed: Web Server (Acuity System patient printout files available on Web browsers), AcuityLink® (Acuity System patient information delivered to mobile devices), HL7 Interface options, Third Party Data Stream Interface and Clinician Notifier Barcode Interface.

Acuity System software further processes data acquired from patient monitors. Acuity Systems with the Arrhythmia Analysis module calculate heart rate using multiple ECG leads and arrhythmia analysis algorithms, whereas the patient monitor uses a heart rate algorithm based on data from a single ECG lead.

The Acuity System is not directly connected to patients. It is designed to be used as a central monitoring system for a set of patient monitors that support both continuously and intermittently acquired data. Supported monitors include, but are not limited to, the following Welch Allyn devices: Propaq® Encore, Propaq CS, Propaq LT and Micropaq® as configured to interface with the Acuity System.

The Acuity System and distributed monitoring devices are prescription devices to be used by authorized health care professionals using standard institutional procedures and good clinical practice guidelines for patient monitoring. Staff training in the operation of the Acuity System and the patient monitoring devices connected to it is essential for optimal use. Users should be skilled at the level of a technician, nurse, physician, health care provider or medical specialist, with the knowledge and experience to acquire and interpret patients' vital-signs data.

Individuals using the Acuity System should be familiar with its operation as described in this manual, and they should understand all warnings and cautions in the manual.

Conventions

WARNING Indicates conditions or practices that could lead to illness, injury, or death.

Caution Indicates conditions or practices that could damage the equipment or other property.

On the product, means "Consult the accompanying documentation."

General warnings and cautions

Warnings

Related to system components and configuration

WARNING Use only accessories approved by Welch Allyn. The use of any other accessories can result in inaccurate patient data, can damage the equipment, and can void your product warranty. See the accessory list or visit www.welchallyn.com.

WARNING Always use accessories according to the standards of your facility and according to the manufacturer's directions.

WARNING Welch Allyn has verified that Welch Allyn-specified network requirements for this Acuity System have been met. Altering the cabling or connecting the Acuity System to another type of power source could damage the equipment, cause system restarts or hazardous conditions on the network, or result in inaccurate patient information at the Acuity Central Station.

WARNING Do not change Acuity System components or configuration, such as removing or adding a printer or substituting hardware, without approval by Welch Allyn. Such changes could degrade system performance and affect patient monitoring.

WARNING Devices connected to the Acuity System must be certified for overall system compliance according to the European Norm 60601-1 and 60950 safety standards. The interconnection of any device with an Acuity System must comply with IEC 60601-1-1. Devices listed in the *Acuity System installation planning guide* comply with these standards. If in doubt about network connectors or devices, please consult your facility's Biomedical Engineering department or Welch Allyn Technical Support.

WARNING It is strongly recommended that Acuity Systems be installed with redundant power supplies and redundant means of operator surveillance, such as secondary central stations and hallway message panels. Acuity System alarms, alerts or other events can go unnoticed if clinical personnel are not present at the Acuity Central Station or if interruptions occur in power or system operations.

WARNING Ensure that no headphones or headphone adapters are connected to the headphone input of your computer. A connection in the headphone jack of a computer will cancel speaker output for any audible alarms associated with the Acuity System.

WARNING Ensure that the volume level on your computer is not set too low or is not set to mute as this may cause you to miss audible alarms generated from the Acuity System.

Related to close physical surveillance and specific patient populations

WARNING It is important that clinicians understand and communicate to all staff using the Acuity Central Station that any arrhythmia analysis software program is an effective tool to assist in patient care, but arrhythmia analysis packages are unable to achieve 100 percent accuracy for all morphologies and occurrences of QRS and PVC detection. Thus, close physical surveillance and clinical interpretation of cardiac data must still be an integral part of every patient's care. Clinicians must review all data obtained from the Acuity System before implementing therapy based on the data.

WARNING Ensure that Acuity System patients are kept under close surveillance, especially patients prone to arrhythmia events. Use the Acuity System only in conjunction with close surveillance by trained clinicians.

WARNING Do not use the Arrhythmia Analysis or ST Analysis feature on neonates. The Arrhythmia Analysis and ST Analysis options are not intended for use with neonatal patients.

WARNING Keep *all* pacemaker patients under close observation. Rate meters might continue to count the pacemaker rate during occurrences of cardiac arrest or some arrhythmias. Do not rely solely upon rate meter alarms.

Related to monitoring interruption

WARNING If you view an Acuity System display remotely and its primary Acuity System fails, you lose all access to the remote display. Monitoring a patient at an Auto-Open Secondary (AOS) or Patient List Review (PLR) remote station is not a substitute for monitoring a patient at the primary Acuity Central Station.

WARNING Use wireless monitors only on patients who can tolerate intermittent monitoring interruptions. All wireless systems are prone to intermittent signal dropout. During signal dropout periods, arrhythmia and ST-segment analyses cannot be performed, and the Acuity System does not show alarms or alerts.

WARNING If an Acuity Central Station display is intentionally or inadvertently muted, alarm and alert tones do not occur at the display. If your central station display includes audible tones, remain aware of whether they are occurring. If they appear to have stopped, ensure that tones are restored.

WARNING If normal central processing unit (CPU) operation is interrupted, for example, during CPU maintenance, scheduled and unscheduled reboots, power loss or a high-availability (HA) CPU switchover period, central station monitoring and analysis temporarily stop.

The Acuity System cannot collect patient review data during the interruption period. That data becomes permanently unavailable.

Auto-reboots and HA CPU switchovers occur infrequently, but poor environmental conditions and failure to perform preventative maintenance can increase frequency of occurrence.

WARNING Whenever an interruption in Acuity System CPU operation occurs, please contact Welch Allyn Technical Service soon to ensure that your entire system has returned to normal operating condition and that it does not require further service.

Cautions

Caution U. S. Federal law restricts this device to sale by or on the order of a physician.

Acuity System compliance with safety standards

CE 0297 The CE Mark and Notified Body Registration Number signify that the product meets all essential requirements of European Medical Device Directive 93/42/EEC.

Table 1. Acuity System compliance with safety standards

Acuity System component(s)	Product category	Organization and standard
Propaq Encore, Propaq CS, Propaq LT, Welch Allyn 1500 Patient Monitor and Micropaq monitors	Medical Equipment	EN 60601-1:1990 A1:1992, A2:1995
Wireless Micropaq, Propaq LT and Propaq CS monitors		IEEE 802.11, Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications IEEE 802.11a, 802.11e, 802.11h, 802.1X, 5 GHz
All components operating together as a system	Electromagnetic compatibility for Medical Equipment	IEC 60601-1-2:2007
All components operating together as a system	Medical Systems	IEC 60601-1-1:2000
All information systems components	Information Technology Equipment	EN 60950:1994
Acuity System cordless receiver cabinet	Electromagnetic compatibility	FCC Class A[a]

a. When the equipment is operated in a commercial environment, Class A limits provide reasonable protection against harmful interference. The equipment generates, uses and can radiate radio frequency energy; if it is not used in accordance with this reference guide, or if it is modified from original installation, it might cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user is required to correct the interference at his own expense.

Related documents

Acuity and Mobile Acuity LT Central Monitoring Systems

Directions for use

Acuity and Mobile Acuity LT Central Monitoring Systems directions for use and in-service guide CD-ROM (multilanguage)

Acuity and Mobile Acuity LT Central Monitoring Systems directions for use

Acuity Central Monitoring System in-service guide (English)

Mobile Acuity LT installation guide (printed)

Mobile Acuity LT System installation guide (En, Fr, Ger, Sp, It, Pol)

Quick card

Acuity System Icons (English, printed)

Welch Allyn Connectivity Server (WACS)

Welch Allyn Connectivity Server (WACS) CD-ROM (English):

Welch Allyn Connectivity Server directions for use

Welch Allyn Connectivity Server programmer's guide

AcuityLink-Clinician Notifier directions for use

AcuityLink-Clinician Notifier Software

AcuityLink-Clinician Notifier software installation instructions (English)

Welch Allyn patient monitors

Micropaq Monitor directions for use CD-ROM (multilanguage)

Propaq LT Monitor directions for use CD-ROM (multilanguage)

Propaq CS Monitor directions for use CD-ROM (multilanguage)

Propaq Encore Monitor directions for use CD-ROM (multilanguage)

Welch Allyn 1500 Patient Monitor directions for use CD-ROM (multilanguage)

2 Acuity System overview

System configurations

Acuity Central Monitoring System

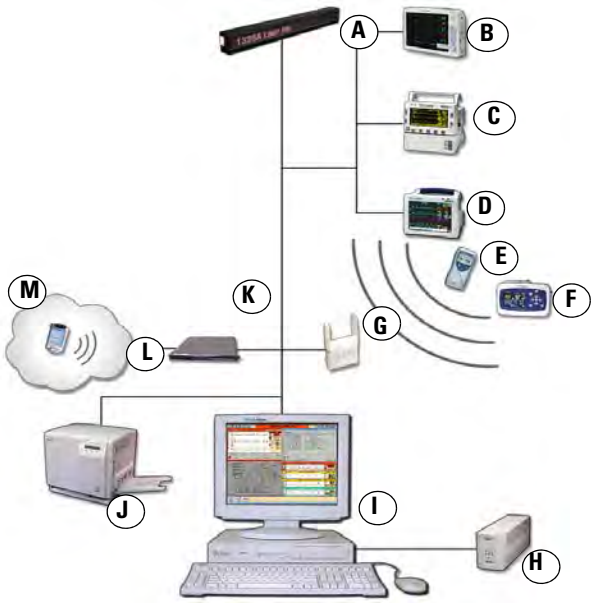
Mobile Acuity LT System

The Acuity System consists of an Acuity Central Station that receives, displays and analyzes information from various wireless and hardwired monitoring devices. Mobile Acuity LT Central Stations are laptop computers.

Some Acuity Systems can send patient data to Internet browsers and hospital information systems (HISs) via the optional Welch Allyn Connectivity Server (WACS). The systems can receive patient information also from HISs.

The FlexNet® concept allows several Acuity Systems to centrally monitor groups of patients resident on local Acuity Systems within a hospital and on networked Acuity Systems in smaller clinics or hospitals. Transfers can occur from system to system and remote viewing of real-time and historical Full Disclosure data is available for consultation from any of the Acuity Systems.

Diagram of the System



A. Hallway message panel	Optional panels, located throughout a unit, visually indicate alarms and some alerts.
B. Welch Allyn 1500 Patient Monitor	Hardwired, full-featured monitors with 12-lead ECG analysis and large displays
C. Propaq Encore monitor	Hardwired, portable, full-featured vital-sign monitors
D. Propaq CS monitor	Wireless or hardwired full-featured vital-sign monitors with large displays
E. Micropaq monitor	Small, wireless monitors that measure ECG and SpO_2. These monitors are useful for ambulatory patients
F. Propaq LT monitor	Small, wireless monitors that measure ECG/Resp, SpO_2 and NIBP. These monitors are capable of displaying large numerics.
G. Wireless access point	Connects wireless monitors and the Acuity Central Station.
H. Uninterruptible power supply (UPS)	Provides power to the Acuity System for a few minutes during power outages, until back-up generators come on line.
I. Acuity Central Station	Monitors all connected patients, stores patient information, and displays alarms and alerts.
J. Laser printer	Optional laser printers give you printouts of various types of patient information.
K. Welch Allyn Connectivity Server (WACS)	An option to the Acuity System. WACS is a server platform on which software options are installed.
L. Hospital network	Carries information to the Acuity System and carries patient data to the hospital information system (HIS/CIS).
M. Mobile device running Clinician Notifier software	AcuityLink is a WACS option that delivers Acuity System patient information to mobile devices running Clinician Notifier software.

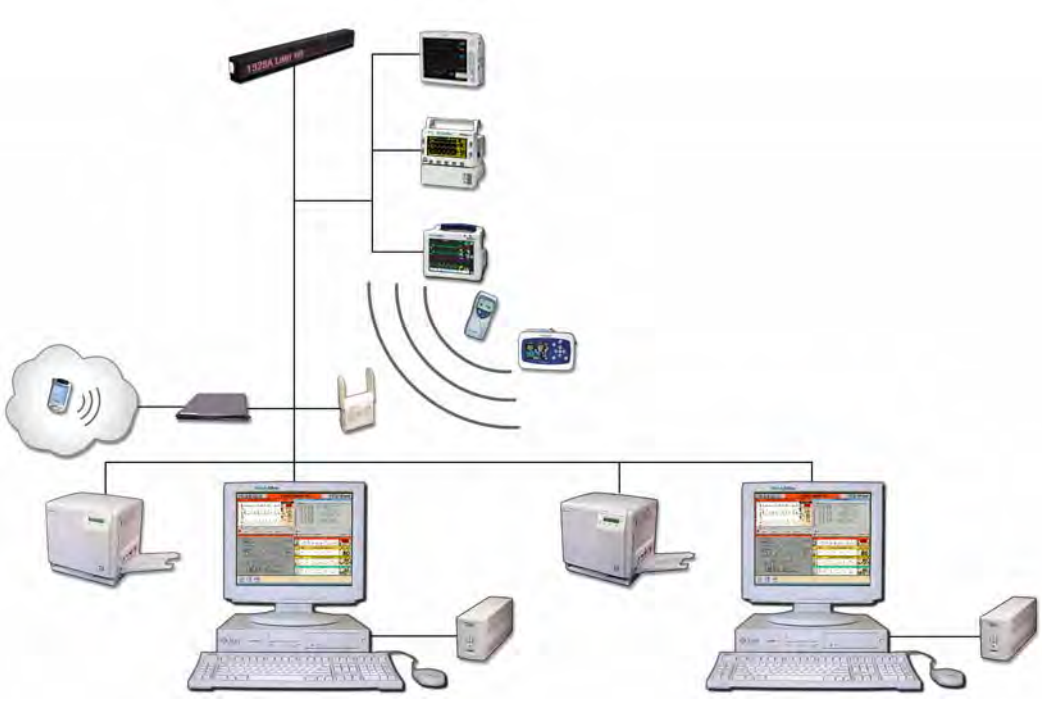
Note Some patient monitors that can communicate within the Acuity System might not be represented in this diagram.

Networked Acuity System features

Networked Acuity Systems include various features. This section presents these network features:

- Remote Patient List Review (PLR) station
- Paired system CPUs (high-availability pairs)

Remote Patient List Review (PLR) station



Networked Acuity System with a remote Patient List Review (PLR) station

Some networked Acuity Systems include one or more remote Patient List Review stations. Clinicians can do these things at a PLR station:

- Open Waveform Windows.
- Open a Virtual Monitor.
- View realtime vital signs in all relevant windows.
- Open review windows.
- Print records and specify auto-printing for a patient.

WARNING If you view an Acuity System display remotely and its primary Acuity System fails, you lose all access to the remote display. Monitoring a patient at an Auto-Open Secondary (AOS) or Patient List Review (PLR) remote station is not a substitute for monitoring a patient at the primary Acuity Central Station.

To open a Waveform Window on a PLR station screen

PLR stations are typically part of an extended Acuity System network.

To open a patient's Waveform Window from a PLR station, first locate the patient via the Patient List, and then open the patient's Waveform Window.

1. In the lower left corner of the Acuity Central Station screen, click .

   The Patient List window appears.

2. Scroll the patient list.

   - If the patient is listed, proceed to Step 4.
   - If the patient is not listed, click **Other Patients** to view networked Acuity System units.

     The Other Patients Lists window appears.

3. List patients by one of these criteria:

   - Click **Unit**, and then select the unit name from the list in the box on the right.
   - Click **Last Name** or **First Name**, and then click the first letter of the name.

4. Click a column heading to sort the list by name, location or ID.

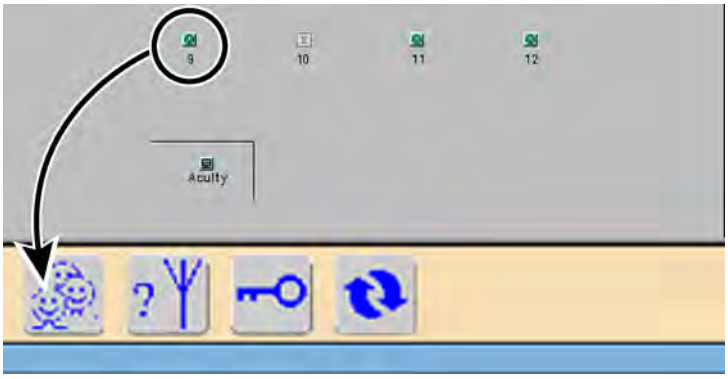
   Actively monitored patients are listed at the top.

5. Locate the patient name in the list, and then click the name.

6. Click .

   The patient's Waveform Window appears on the PLR station screen.

To close a Waveform Window on a PLR station screen



1. Drag the corresponding map icon to .

   The Waveform Window and map icon close.

Flexible patient access (FPA) using virtual network computing (VNC)

Note The FPA using VNC configuration is a licensable feature. To order this feature, contact your Welch Allyn sales representative (see page ii).

The flexible patient access option allows you to connect to a Patient List Remote using a VNC connection. Each purchased VNC license allows one VNC client to view real-time and full-disclosure data on monitored patients.

The Acuity Central Station supports two editions of the VNC server, however these two editions cannot be mixed on a single Patient List Remote. The VNC Free Edition Server is pre-installed as a part of the Acuity System, however a license must be purchased in order to use FPA. The VNC Enterprise Edition Server offers features not included in the free edition, and can be purchased for an additional fee.

There are three screen resolutions available for the VNC connection.

Resolution	View type	Standard port number
1280 x 1024	Standard resolution	5
1680 x 1050	Widescreen resolution	6
1024 x 704	Single patient view	7

To log on to flexible patient access using VNC

1. Ensure that you have installed a version of the VNC client application.
2. Launch your VNC client application.

   The VNC connection screen appears.
3. Enter the IP address or host name, a colon, and the port number of the VNC server and press **OK**. Do not add spaces between your entries.

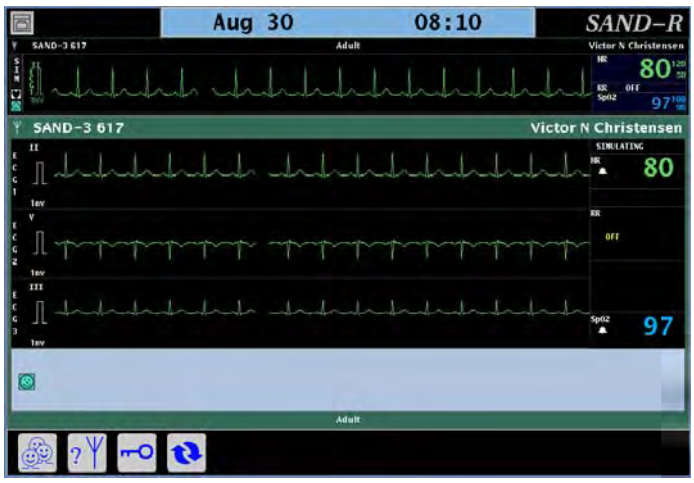
Note It is recommended that your biomedical engineer work with your facility's IT department and add the host name of your VNC port forwarder to the domain name server (DNS), so that changes to the port forwarder IP address do not affect VNC users. It is also recommended that you use "acuity" as the host name of the port forwarder.

4. Enter your VNC client password.

   If you are using the VNC Enterprise Edition Server, enter your user name and password.

5. Press **OK**.

   The Remote Patient List Review window appears. For more information see "Remote Patient List Review (PLR) station" on page 11.



Note FPA connections are not shared between individual client connections. The Acuity Central Station allows only one client to connect to each display session. When you disconnect from a remote viewing session, the windows and views are not reset. It is recommended that you close all patient windows on the viewing client before disconnecting.

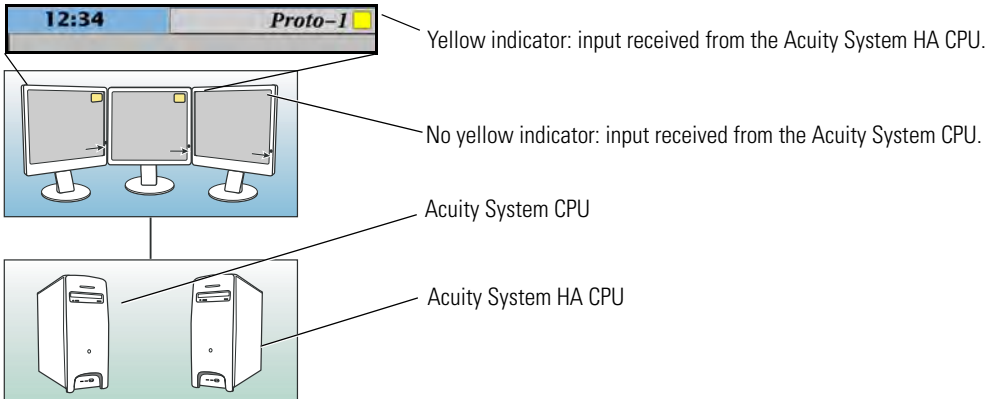
Paired system CPUs (High-availability pairs) and switchovers

Acuity Systems that typically support at least 29 patients include a high availability (HA) central processing unit (CPU). The HA CPU is a redundant Acuity System CPU.

An HA CPU assumes control if the Acuity System CPU's operation is interrupted. An HA CPU "switchover" occurs to ensure minimal loss of Acuity Central Station monitoring capability. Historical data that had been gathered by the non-operational CPU before the switchover might not be available for some patients until that CPU becomes operational.

At any one time, displays in a paired CPU system should all receive input from either the Acuity System CPU or the HA CPU.

To ensure that all displays in a paired CPU system receive input from the same CPU


12:34
Proto–1
Yellow indicator: input received from the Acuity System HA CPU.
No yellow indicator: input received from the Acuity System CPU.
Acuity System CPU
Acuity System HA CPU

During normal operating conditions

1. Ensure that none of the displays shows a yellow indicator in the top right corner.

   If none shows a yellow indicator, the system is receiving input properly. If any display shows a yellow indicator, proceed to the next step.

2. On any display with a yellow indicator, press the video input button, generally located on the front of the display.

   All displays now receive input from the Acuity System CPU, and alarms and alerts appear on all of them. No displays show a yellow indicator.

During interruption of Acuity System CPU operation

1. Ensure that all displays show a yellow indicator in their top right corners.

   If any display does *not* show a yellow indicator, proceed to the next step.

2. On any display *without* a yellow indicator, press the video input button, generally located on the front of the display.

   All displays now receive input from the Acuity System HA CPU, and they all show a yellow indicator. If one or more of the displays is blank, or if all Virtual Monitors do not reappear with their original border colors in approximately five minutes, see Table 10 on page 148.

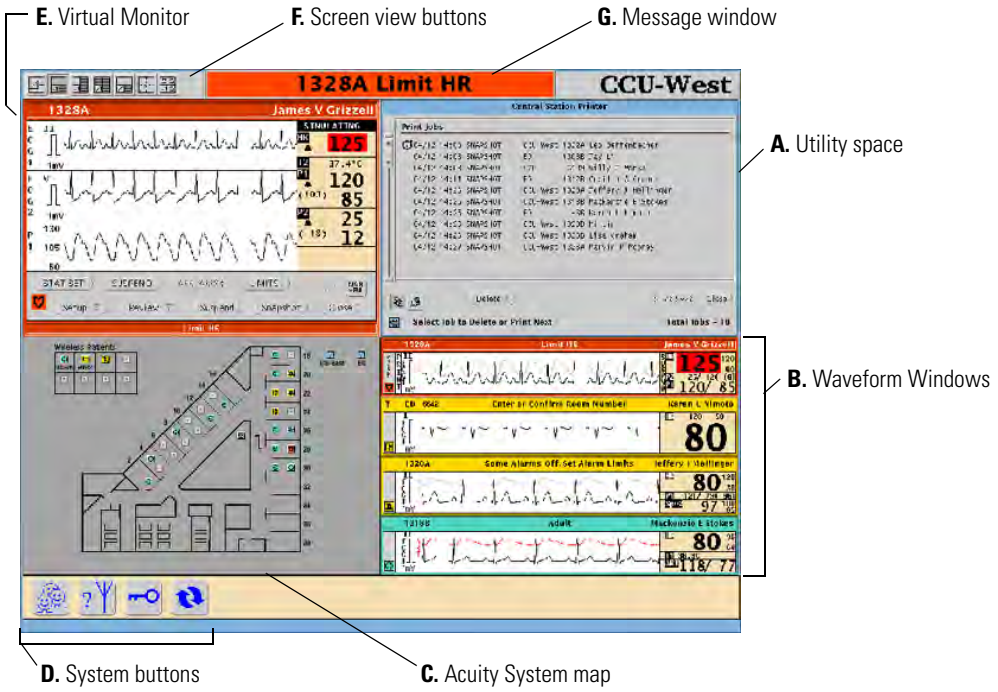
WARNING Whenever an interruption in Acuity System CPU operation occurs, please contact Welch Allyn Technical Service soon to ensure that your entire system has returned to normal operating condition and that it does not require further service.

Central station screen

Note Depending upon the default screen color scheme of your Acuity Central Station (black-on-white or color-on-black), your screen colors may not match those shown in this manual.

Depending upon the selected screen view, the Acuity Central Station screen can include these areas:

- Map area
- Virtual Monitor
- Utility space
- Waveform Windows area



A. Utility space	Displays a patient's Setup windows, Review windows, Patient List window, and Central Station Printer windows.
B. Waveform Windows	Abbreviated Virtual Monitors.
C. Acuity System map	Shows the location and status of patients, and it displays status icons for system equipment. You open a patient's Waveform Window or Virtual Monitor by clicking the patient's map icon once or twice.
D. System buttons	Open the patient list, show patients who are connected to wireless monitors, open system administration windows, and sort the order of Waveform Windows.
E. Virtual Monitor	Displays the patient's vital-signs information and status.

F. Screen view buttons	Change the overall Acuity System screen view. They vary in appearance according to your system configuration.
G. Message window	Displays the date and time or the location of alarms and alerts. It matches (optional) hallway message panel messages.

Note Welch Allyn Acuity Systems communicate with some patient monitors that include Masimo® Corporation SpO_2 measurement capabilities. If a monitor communicating with your Acuity System has such capabilities, the monitor's corresponding Acuity System Virtual Monitor, Waveform Window, some review windows and some printouts include SpO_2 Perfusion Index (PI) and Signal IQ™ indicators and numerics.

For more information regarding Perfusion Index (PI) and Signal IQ™, please refer to Masimo Corporation literature or http://www.masimo.com.

System screen views

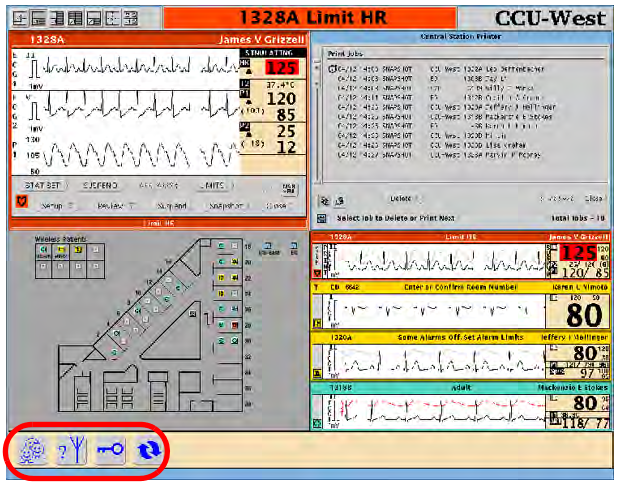
You can change the screen view of the Acuity Central Station display by clicking these buttons along the top left of the Acuity Central Station screen. Your system includes some or all of these choices.

If your system includes multiple screens, the additional screens show Waveform Windows or Virtual Monitors.

Button	Description
 Map View	Expands the map to cover most of the Acuity Central Station screen. Map shows room locations and status icons of all monitored patients. One Virtual Monitor and review window cover part of the map.
 4-Waveforms View 2-Utilities View	The 4-waveforms view shows four Waveform Windows, two utility windows and one Virtual Monitor. A utility window can cover the map. If your system includes multiple screens, this view can show two utility windows and one Virtual Monitor.
 8-Waveforms View	Shows eight Waveform Windows and one Virtual Monitor. A utility window can cover the map.
 12-Waveforms View	Shows 12 Waveform Windows. A Virtual Monitor can cover the map and can be replaced by a utility window.
 Half Screen Review View	The top half of this view shows a review window and the bottom right quarter of the screen shows four Waveform Windows. The map in the bottom left quarter might be covered by a Virtual Monitor or utility window. If your system includes multiple screens, a Virtual Monitor replaces the Waveform Windows.
 Full-Screen Review View	Shows one review window for one patient.
 All Monitors View	Shows three Virtual Monitors and one utility window that can cover the map; shows no Waveform Windows.

System buttons

The system buttons in the lower left corner of the Acuity Central Station screen provide quick access to frequently used system-wide functions.



The Patient List button opens the Patient List window, which enables you to preadmit, readmit, transfer, and discharge patients in your Acuity System. You can also view and print stored waveforms and trends of patients who have not been monitored by the Acuity System for (up to) 96 hours.

If your Acuity System is connected within a network of Acuity Systems, depending upon the type of network, you can perform the above functions for networked patients. You can also locate networked patients, edit their patient information, change their alarm limits and suspend their alarms and alerts.

A Patient List button is displayed also in review windows that have been opened by way of the Patient List window.

When you click and hold the View Wireless button, the map icons of all patients that are connected to wireless monitors change to Wireless icons; other patient icons become gray boxes. The map returns to normal when you release the button on your mouse or trackball.

The System Administration button opens a window that allows designated system administrators to create new user identifications and to adjust system time.

The Sort Windows button sorts all Waveform Windows and any open Virtual Monitor windows by room number, in alphanumeric order. The sorting only applies to the current screen view.

- Waveform Windows for monitors without confirmed patient IDs are located at the end.
- For networked Acuity Systems with more than one Acuity System unit, rooms are grouped together according to Acuity System unit.
- The order in which windows are displayed depends on how your system has been configured. Generally, windows are displayed from top to bottom and left to right.

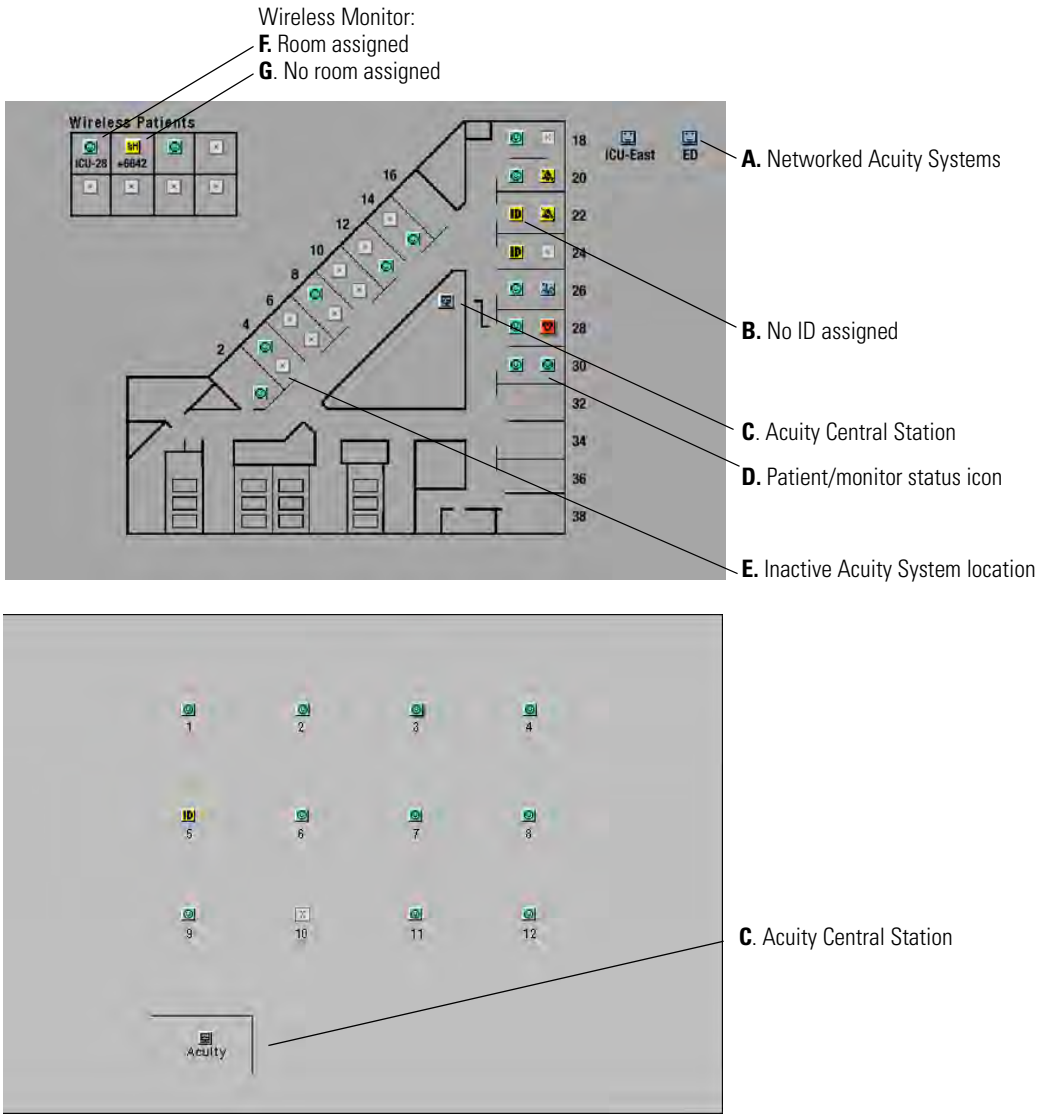
  If the Sort Windows button is grayed-out, your system is not configured to sort windows. In this case, each Waveform Window space is assigned to a particular room, and unassigned wireless monitors occupy unoccupied Waveform Window spaces. Wireless monitors are “bumped out” to different unoccupied spaces if their spaces become occupied by hardwired monitors.

Central station map and status icons

Your system includes a map that is similar to one of these examples. An Acuity Central Station map shows status icons for these things:

- System components
- Each patient monitor (and associated patient) that is communicating with the Acuity System

For a complete description of all Acuity status icons, see "Status icons" on page 135.

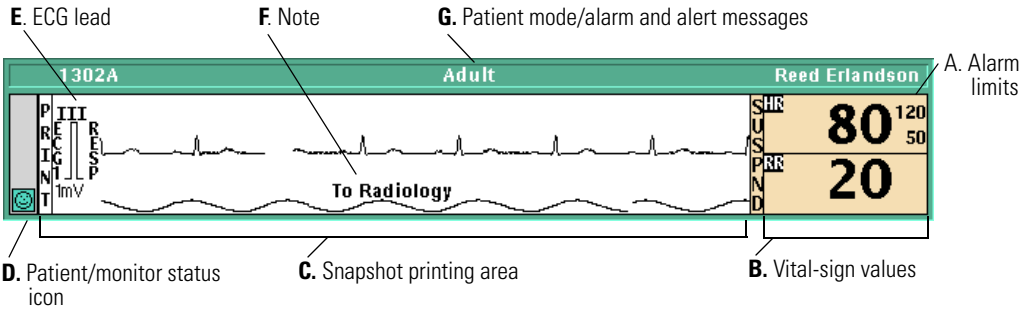


A. Networked Acuity Systems	These status icons represent networked Acuity Systems, and they indicate the state of communications with the networked systems.
B. No ID assigned	No patient ID number has been assigned to the patient connected to this monitor.
C. Acuity Central Station	Icon indicates the Acuity Central Station status. Click to open the Acuity Central Station Printers window.

D. Patient/monitor status icon	Icons appear at locations with active monitors. Click a map icon once to open the patient's Waveform Window or twice to open the Virtual Monitor. For details about all map icons, see "Patient/monitor status icons" on page 136.
E. Inactive Acuity System location	No hardwired monitor is connected to this Acuity System port, or no wireless monitor has been assigned to this location.
Wireless Monitor: F. Room assigned	A room number has been assigned to this patient connected to a wireless monitor.
G. No room assigned	No room number has been assigned to this patient connected to a wireless monitor. The number is the device ID number, and it is replaced by the room number after the room number is assigned.

Waveform Window

A Waveform Window is an abbreviated Virtual Monitor.



A. Alarm limits	Alarm limit settings
B. Vital-sign values	Vital signs in alarm are shown by numbers in a red field. Click in this area to suspend or resume an audible alarm tone. An NIBP numeric reduces in size after 16 minutes.
C. Snapshot printing area	Click in the waveform area to print a snapshot print at the central printer.
D. Patient/monitor status icon	Click the Patient/ Equipment status icon to open the Virtual Monitor. For details about all status icons, see "Status icons" on page 135.
E. ECG lead	The adjacent waveform is derived from this ECG lead.
F. Note	From the Patient ID Setup window, you can type a temporary note to appear here. For details, see "Add or remove a note in a patient's Waveform Window" on page 81.
G. Patient mode/alarm and alert messages	Alarm and alert messages replace the patient mode indicator. Color indicates status: red, alarm; yellow, alert; green, patient vital signs within limits and normal equipment operation; and blue, intentional disconnection.

To open a patient's Waveform Window

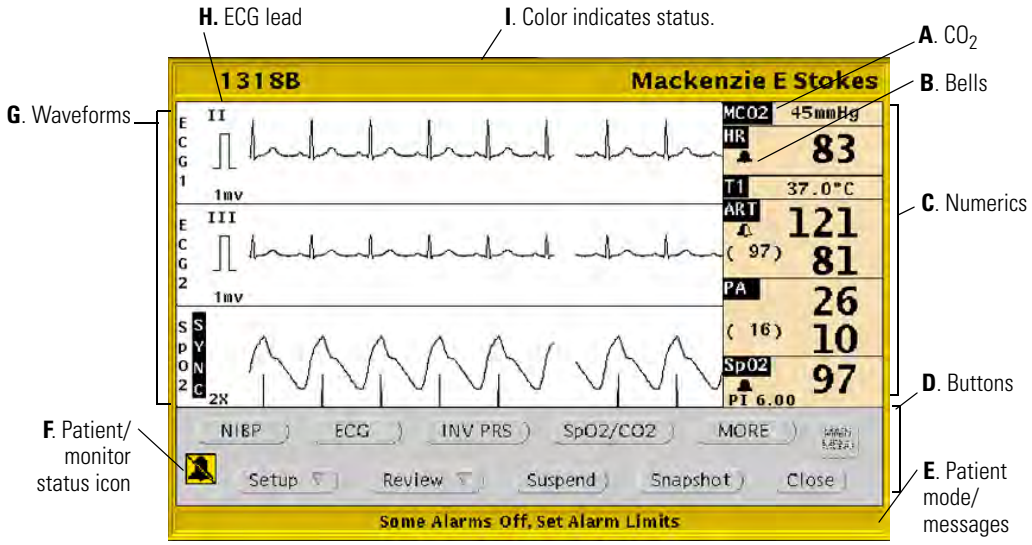
- On the Acuity Central Station screen map, click the patient's map icon.

Note If you are viewing from a Patient List Review (PLR) station, see "To open a Waveform Window on a PLR station screen" on page 12.

Virtual Monitor

An Acuity System Virtual Monitor represents a patient monitor and the information obtained from the monitor. The appearance and button sequences can differ from the actual patient monitor.

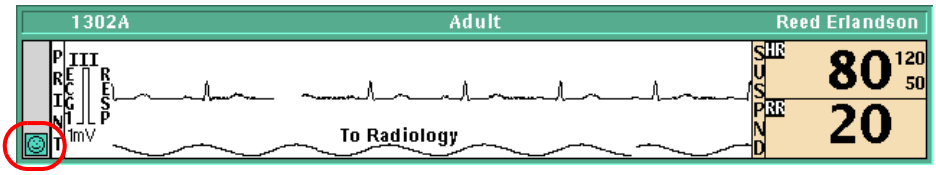
Options or monitor functions that are not available are shown in faint gray type.



A. CO_2	MCO_2 indicates mainstream CO_2. SCO_2 indicates sidestream CO_2.
B. Bells	Bells appear in larger numeric zones. • Solid bell indicates that all of this vital sign's alarm limits are set. • Half-shaded bell indicates that some of this vital sign's alarm limits are set. • Bell missing from larger numeric zone indicates that none of this vital sign's alarm limits are set.
C. Numerics	Up to eight labeled numeric displays
D. Buttons	Buttons are visible when the pointer is within the window. Options or monitor functions that are not available or active are shown in faint gray type. • Setup: Opens setup windows for Patient ID, Alarms, Printouts, Waveform Window, Arrhythmia Alarms, and ST Analysis. • Review: Opens review windows for Graphical Trends, Tabular Trends/Events, Waveforms, Arrhythmia Events, and OxyCRG. • Suspend: Suspends an audible alarm tone for 90 seconds. • Snapshot: Prints a snapshot at the Acuity Central Station printer.
E. Patient mode/messages	Alarm and alert messages replace patient mode indicator.
F. Patient/monitor status icon	Patient/monitor status icon. For details about all status icons, see "Status icons" on page 135.
G. Waveforms	Up to three waveform display areas For patient monitors that include Masimo SpO_2 measurement capabilities, indicator beneath SpO_2 wave is Signal IQ™. For more information, refer to Masimo Corporation literature.
H. ECG lead	The adjacent waveform is derived from this ECG lead. If you want to review waveforms from *all* leads, click **Review, Waveforms** to open the Waveforms Review window.
I. Color indicates status.	Red, patient alarm; Yellow, equipment or patient alert; Green, patient vital signs within limits and normal equipment operation; Blue, intentional disconnection

To open a patient's Virtual Monitor

Take one of these steps at the Acuity Central Station screen:



- Click the status icon in the patient's Waveform Window.

- Click the patient's map icon.

3 Admit and begin monitoring

Preadmit a patient to Acuity System monitoring

If you know a patient's ID number before the patient is admitted, you can save time that would be spent later by preadmitting the patient at the Acuity Central Station.

When a preadmitted patient arrives:

- If the patient is connected to a wireless monitor, at the patient monitor you can simply confirm the patient ID and add a room number.
- If the patient is connected to a hardwired monitor, you can go to the Acuity Central Station and confirm the patient by entering only the ID number.

If a patient is already monitored by a networked Acuity System, a duplicate entry is not allowed, because patient information could be lost.

To preadmit a patient to Acuity System monitoring

1. In the lower left corner of the Acuity Central Station screen, click .

   The Patient List window appears.

2. Click **Admit**.

   The Admit Patient window appears

3. Specify a location.

   - If you know the patient's room number, click the number.
   - If you do not know the patient's room number, click **UNASSIGNED**.

     You can enter the room number later via the Patient List or the Virtual Monitor.

4. Type or scan other patient information.
5. *Carefully review your entries for accuracy.*
6. Click **Confirm**.

   The information is stored.

To assign a room number for a preadmitted patient, via the Patient List

1. In the lower left corner of the Acuity Central Station screen, click .

   The Patient List window appears.

2. Select the patient's name.
3. Click **Transfer**.

   The Transfer Patient window appears.

4. Click a unit name in the list.
5. Click a room.
6. Click **Confirm**.

   The information is stored.

Readmit a discharged patient

You can readmit a patient to the Acuity System if the patient's name still remains in the Patient List.

If a patient has been discharged from the Acuity System, but the system still holds the patient's data, the patient remains in the list. The Acuity System stores patient data for 24 to 96 hours after monitoring stops.

To readmit a discharged patient

1. In the lower left corner of the Acuity Central Station screen, click .

   The Patient List window appears.

2. Select the patient's name.

   If the patient's name does not appear in the patient list, see "Preadmit a patient to Acuity System monitoring" on page 25 to admit the patient.

3. Click **Readmit**.

   The location becomes UNASSIGNED. If you do not know the patient's room number, you can enter it later via the Patient List or Virtual Monitor.

4. If you know the patient's room number, take these steps:

   a. Click **Transfer.**

      The Transfer Patient window opens.

   b. Click a unit name in the list.

   c. Click a room.

5. Click **Confirm**.

   The information is stored.

Begin patient monitor communication with the system

For information about patient monitors that are part of your Acuity System but are not shown in this chapter, consult the patient monitor manufacturer's literature.

Connect a hardwired monitor to the system

To connect the monitor to the system

Propaq CS monitor

Propaq Encore monitor

Welch Allyn 1500 Patient Monitor

1. Connect the Acuity System network cable.
   a. Connect the cable to the Acuity System network connector on the bedside monitor.
   b. Connect the other end of the cable to the bedside network connector.

      For Propaq CS and Propaq Encore monitors, connect the network cable to the bedside connector labeled with this symbol: .

      For a Welch Allyn 1500 Patient Monitor, connect the network cable to the bedside connector labeled with this symbol: .

   The cable clicks into place when it is properly attached. Ensure that the cable is neither damaged nor broken.

WARNING Ensure that you connect the proper monitor network cable to the proper wall jack. Using the wrong network cable or the wrong wall jack connector could damage the monitor, or not send data to the Acuity System. Ensure that the monitor is properly connected to the network before you start monitoring the patient.

2. If the monitor is on, take one of these steps:
   - If it was not monitoring this patient, turn it off and on again to clear prior trends and alarm limits.
   - If it was monitoring this patient and you want to save this patient's trends and alarm limits, keep it turned on.
3. If the monitor is off, turn on the monitor.

Caution Make sure you acknowledge the "Confirm Patient?" prompt on your monitor before switching the monitor from a wireless connection to a hardwired connection (or vice versa). Failure to confirm the patient can result in a licensing error.

To connect the patient to the monitor

1. Attach the lead wires to the electrodes.
2. Apply the electrodes to the patient.

3. Attach the cables to the monitor last, to optimize waveform interpretation during the initial Acuity System learning phase.

To respond to the CONFIRM PATIENT? prompt

1. If you see the CONFIRM PATIENT? prompt, respond as follows:

WARNING Carefully verify the patient's ID and name before you respond to the CONFIRM PATIENT? prompt. If you assign another patient's ID number, the Acuity System could combine patients' Full Disclosure review information.

- If the indicated patient is the correct patient, press **YES**.

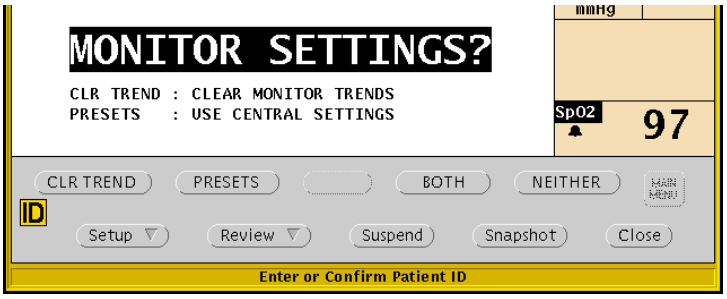
  The patient is confirmed at the Acuity Central Station.

  The Acuity System sends unit default alarm limits and unit settings to the patient monitor.

- If the indicated patient is incorrect, press **NO**.

  The MONITOR SETTINGS? prompt appears.

2. If you see the MONITOR SETTINGS? prompt, click one of these buttons:



CLR TREND
- Clears current trend values.
- Keeps current alarm limits and displays.

PRESETS
- Keeps current trend values.
- Uses Acuity System Presets-- default alarm limits and displays.

BOTH
- Clears current trend values.
- Uses Acuity System Presets-- default alarm limits and displays.

NEITHER
- Keeps current trend values.
- Keeps current alarm limits and displays.

At the central station, the patient map icon remains in the yellow ID or RM unconfirmed state until the ID and room are confirmed.

To enter patient information

1. Verify that the patient mode matches the monitored patient's age (Adult, Pediatric or Neonate).

   - For a Propaq CS monitor: If the mode shown at the top of the screen is incorrect, touch **SETUP**, **MORE**, **CHANGE,** and then touch the appropriate mode.
   - For a Propaq Encore monitor: Press **SETUP**, **MORE**, and check the patient mode.

     If the mode is incorrect, press **NEXT** to highlight the mode, and then press **CHANGE** until the correct mode is shown.
   - For a Welch Allyn 1500 Patient Monitor: If the mode shown in the Information field is incorrect, press the **Menu** key, use the trim knob to scroll to **Patient Mode**, press the trim knob to enter the menu, and select the appropriate mode.

2. If the patient is not confirmed, write down the patient's name, ID and room number, and ensure that the information is delivered to the Acuity Central Station for patient confirmation.

   At the central station, the patient map icon remains in the yellow ID or RM unconfirmed state until the ID and room are confirmed.

3. (Optional) Customize alarm limits using patient monitor keys or the Alarms Setup window at the Acuity Central Station. See "Adjust a patient's alarm limits" on page 46.

WARNING When a patient is connected to a monitor, ensure that the default alarm limits are appropriate for the patient. The system uses Acuity System Presets values for Arrhythmia Analysis and ST Analysis limits and monitor default values for all other limits (if the monitor can save default values).

Before you set customized alarm limits for a patient, confirm the patient's ID and room number. Otherwise, customized limits might be lost.

Start communication between a wireless monitor and the system

For information about patient monitors that are part of your Acuity System but are not shown in this chapter, consult the patient monitor manufacturer's literature.

Note If a wireless patient monitor operates outside of its wireless communication area, the monitor aggressively searches for connection with the central station and depletes its battery life at a faster rate. If it searches for an extended period of time (typically more than four hours), it can display a system fault error that necessitates turning the monitor off and on again.

Micropaq monitor

WARNING Do not attempt to monitor neonatal patients' ECGs using a Micropaq monitor. Micropaq monitors are intended for use with adult and pediatric patients only.

To start Micropaq monitor communication with the Acuity System and connect the patient to the monitor

Perform steps in the following order to ensure that both the monitor and the Acuity Central Station display the default ECG leads.

1. Use a Micropaq monitor that is designated for use within the Acuity System network in which the patient will be monitored.
2. Install a newly charged battery in the battery compartment at the back of the Micropaq monitor, using a bottom-to-top approach.
3. Immediately determine the patient mode, which appears *briefly* on the first Micropaq monitor screen.

   If the patient mode does not match the patient age, change the mode at the Acuity Central Station. See "Change the Patient Mode" in Table 2 on page 43.
4. Attach the lead wires to the electrodes.
5. Apply the electrodes to the patient.
6. Attach the cables to the monitor last, to optimize waveform interpretation during the initial Acuity System learning phase.

To enter patient information

1. If prompted, press ▼ to highlight the unit in which the patient will be monitored, and then press ✓ to select it.

   If the keys are locked, simultaneously hold down ✓ and ▼ to release the menus.

2. Scroll the patient list, and take one of these steps:

   - If you see the patient's ID/name, select it, and then select the patient's room number. The patient is confirmed at the Acuity Central Station.

     If you do not know the patient's room number, choose **Select room at Central.**

   - If you do not see the patient's ID/name, choose **Select patient at Central**.

3. If you did not enter a patient ID/name and room number, take these steps:

   a. Write down the patient name, ID, room number and the four-digit serial number that is in the upper right corner of the Micropaq monitor screen.

   b. Ensure that the information is delivered to the Acuity Central Station for patient confirmation.

   At the central station, the patient map icon remains in the yellow ID or RM unconfirmed state until the ID and room are confirmed.

4. (Optional) Customize alarm limits using patient monitor keys or the Alarms Setup window at the Acuity Central Station. See "Adjust a patient's alarm limits" on page 46.

WARNING When a patient is connected to a monitor, ensure that the default alarm limits are appropriate for the patient. The system uses Acuity System Presets values for Arrhythmia Analysis and ST Analysis limits and monitor default values for all other limits (if the monitor can save default values).

Before you set customized alarm limits for a patient, confirm the patient's ID and room number. Otherwise, customized limits might be lost.

Propaq LT monitor

To start Propaq LT monitor communication with the Acuity System and connect the patient to the monitor

1. Use a Propaq LT monitor that is designated for use within the Acuity System network in which the patient will be monitored.
2. Turn on the monitor.
3. In the top right area of the Propaq LT monitor screen, verify that the battery icon is green, which indicates that the battery is fully charged.

   If it is not green, monitor the patient with another (fully charged) monitor.
4. Attach the lead wires to the electrodes.
5. Apply the electrodes to the patient.
6. Attach the cables to the monitor last, to optimize waveform interpretation during the initial Acuity System learning phase.
7. Look for a steady green light at the top of the monitor to confirm that the monitor is communicating with the Acuity System.

   If the monitor is not communicating with the Acuity System, use another monitor.

To enter patient information

1. Specify whether existing patient data will be saved.

   - If the patient matches the name on the Propaq LT monitor screen, press an arrow key to highlight **Continue Patient**, and then press ⦿ to select it. The patient's data is saved and a unit list appears.
   - If the patient does not match the name on the Propaq LT monitor screen, press an arrow key to highlight **Start New Patient**, and then press ⦿ to select it. Patient data is cleared and a unit list appears.

   If the keypad, display or backlight is locked, simultaneously press ▲, ▼ and ▶.

2. Select the unit in which your patient will be monitored.

   A patient list appears.

3. Scroll the patient list, and take one of these steps:

- If you see the patient's ID/name, take these steps:

   a. Select the ID/name.

      A room list appears.

   b. Select the patient's room.

      The patient is confirmed at the Acuity Central Station.

- If you do not see the patient's ID/name, take these steps:

   a. Write down the patient's name, ID, room number and the last four-digits of the serial number that is on the back of the Propaq LT monitor.

   b. Ensure that the information is delivered to the Acuity Central Station for patient confirmation.

   At the central station, the patient map icon remains in the yellow ID or RM unconfirmed state until the ID and room are confirmed.

4. Along the top of the Propaq LT monitor screen, verify that the patient mode matches the monitored patient's age (Adult, Pediatric or Neonate).

   If it does not match, take these steps:

   a. Select the current patient mode.

   b. Select the appropriate patient mode, and then follow the prompts.

5. (Optional) Customize alarm limits using patient monitor keys or the Alarms Setup window at the Acuity Central Station. See "Adjust a patient's alarm limits" on page 46.

WARNING When a patient is connected to a monitor, ensure that the default alarm limits are appropriate for the patient. The system uses Acuity System Presets values for Arrhythmia Analysis and ST Analysis limits and monitor default values for all other limits (if the monitor can save default values).

Before you set customized alarm limits for a patient, confirm the patient's ID and room number. Otherwise, customized limits might be lost.

Wireless Propaq CS monitor

To start wireless Propaq CS monitor communication with the system

1. Use a Propaq CS monitor that is designated for use within the Acuity System network in which the patient will be monitored.
2. Verify that the Acuity System network cable is *not* plugged into the Acuity System network connector on the monitor.
3. If the monitor is on, take one of these steps:
   - If it was not monitoring this patient, turn it off and on again to clear prior trends and alarm limits.
   - If it was monitoring this patient and you want to save this patient's trends and alarm limits, keep it turned on.
4. If the monitor is off, turn on the monitor.
5. If you see a low battery indicator on the top of the Propaq CS monitor screen, connect the monitor to AC power to charge it, or use another monitor.
6. Verify that ON NETWORK flashes in the upper left corner of the Propaq CS monitor screen.

   This could take a few minutes. If ON NETWORK does not appear, use another monitor and contact qualified service personnel.

To connect the patient

1. Attach the lead wires to the electrodes.
2. Apply the electrodes to the patient.
3. Attach the cables to the monitor last, to optimize waveform interpretation during the initial Acuity System learning phase.

To enter patient information

1. If you see the CONFIRM PATIENT? prompt, follow the prompts.

   For instructions, see "To respond to the CONFIRM PATIENT? prompt" on page 30

2. If the monitor displays a choice of units, scroll to highlight the unit in which the patient will be monitored, and then touch **Select**.

   A patient list appears.

3. Scroll the patient list, and take one of these steps:

- If you see the patient's ID/name in the patient list, take these steps:

   a. Highlight the patient, and then touch **Select**.

      A room list appears.

   b. If you know the patient's room number, highlight the number, and then touch **Select**. The patient is confirmed at the Acuity Central Station.

      If you do not know the patient's room number, highlight **Select room at Central**, and then touch **Select**.

- If you do not see the patient's ID/name in the patient list, highlight **Select patient at Central**, and then touch **Select**.

4. Along the top of the Propaq CS monitor screen, verify that the patient mode matches the patient's age (Adult, Pediatric or Neonate).

   If the patient mode does not match, touch **SETUP**, **MORE**, **CHANGE,** and then touch the appropriate mode.

5. If you did not enter a patient ID/name and room number, take these steps:

   a. Write down the patient's name, ID, room number and the last four-digits of the serial number that is under the handle of the Propaq CS monitor.

   b. Ensure that the information is delivered to the Acuity Central Station for patient confirmation.

      At the central station, the patient map icon remains in the yellow ID or RM unconfirmed state until the ID and room are confirmed.

6. (Optional) Customize alarm limits using patient monitor keys or the Alarms Setup window at the Acuity Central Station. See "Adjust a patient's alarm limits" on page 46.

WARNING When a patient is connected to a monitor, ensure that the default alarm limits are appropriate for the patient. The system uses Acuity System Presets values for Arrhythmia Analysis and ST Analysis limits and monitor default values for all other limits (if the monitor can save default values).

Before you set customized alarm limits for a patient, confirm the patient's ID and room number. Otherwise, customized limits might be lost.

Important considerations: connecting a monitor to the Acuity System

Related to specific patient populations

WARNING Always check patient mode in the border of the Waveform Window or Virtual Monitor. Incorrect patient mode can result in unsuitable alarm settings, inaccurate heart rate readings and inappropriate arrhythmia and ST-segment analyses.

Related to wireless monitoring

WARNING Use wireless monitors only on patients who can tolerate intermittent monitoring interruptions. All wireless systems are prone to intermittent signal dropout. During signal dropout periods, arrhythmia and ST-segment analyses cannot be performed, and the Acuity System does not show alarms or alerts.

WARNING Check for a light above the monitor screen or a wireless icon ( ) on the screen to ensure that communication is established between the monitor and the Acuity System. means communication is not established. If you cannot establish communication, use another monitor, and contact qualified service personnel.

Related to hardwired monitoring

WARNING Ensure that you connect the proper monitor network cable to the proper wall jack. Using the wrong network cable or the wrong wall jack connector could damage the monitor, or not send data to the Acuity System. Ensure that the monitor is properly connected to the network before you start monitoring the patient.

Related to trends and alarm limits

WARNING Before you use a monitor on a new patient, always turn off the monitor for a few seconds, and then turn it on again. This clears the prior patient's trends and alarm limits.

WARNING Always check alarm limits when a monitor reestablishes communication with the Acuity System. If you change limits at a monitor while it is not communicating with the Acuity System (for example, during transport or signal dropout), when you reestablish communication with the system, the limits might change to Acuity System Presets values.

Related to leads, cables and the ECG display

WARNING Ensure that the Acuity System network cable is neither damaged nor broken. An Acuity System cable is the sole link between a hardwired monitor and an Acuity System.

WARNING Always replace disconnected lead wires immediately. If a lead wire becomes disconnected and a second lead is not available, the Virtual Monitor might show the same lead for ECG1 and ECG2.

WARNING Carefully monitor lead-wire connections of patients prone to arrhythmia events. If a lead wire disconnects during an event, the Acuity System's ability to accurately detect the event can be compromised.

WARNING If your system includes arrhythmia analysis, and if you connect, change or move an electrode, ensure that a RELEARN alert occurs at the patient monitor and the virtual monitor.

Moving or changing an electrode can change the beat morphology. If the system does not learn the new morphology, it might not alarm or it might cause false alarms. The relearn process establishes the new morphology as the normal ECG rhythm for arrhythmia and ST-segment analyses.

- If a RELEARN alert occurs after changing or moving an electrode, carefully evaluate the new ECG rhythm and the current ST segment for all active leads to make sure that the Acuity System has learned an appropriate rhythm. For evaluation instructions, see "Respond to a RELEARN alert" on page 90.
- If a RELEARN alert does not occur after changing or moving an electrode, initiate a relearn event. For instructions, see "To initiate relearn of a patient's ECG rhythm for arrhythmia and ST-segment analyses" on page 65.

WARNING Minimize patient movement during a RELEARN, as movement creates noise during the reading. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm. Ensure that the patient remains still for 5 minutes after the RELEARN before allowing them to move.

WARNING Ensure these things to minimize false HR, Arrhythmia Analysis and ST Analysis alarms, and to achieve optimal event detection and analysis:

- ECG cable, lead wires and electrodes are undamaged.
- Patient's skin is properly prepared.
- Electrodes are placed using standard good practices.
- 5-wire ECG cable is used. A 3-wire cable limits arrhythmia and ST-segment analyses to a single lead, and ST analysis is disabled when a lead failure occurs.
- LL electrode is connected. Otherwise, only one ECG lead is available and arrhythmia and ST-segment analyses are effected.
- Patient monitor and Virtual Monitor display these things:

  -HR numeric and ECG waveform

  -Non-noisy signal. If signal is noisy, reduce patient movement and increase distance from other electrical devices.

  -Correct patient mode for the patient
- Virtual Monitor ECG 1 and 2 display these things:

  -ECG waveform

  -Waveform amplitude at least 160 µV, peak-to-peak

  -QRS complex amplitude at least twice the P or T wave amplitude

Enter and confirm a patient's ID or room at the central station

A patient's Acuity System window borders and icons are in a yellow (alert) state if the patient's ID and room number have not been confirmed.

You can scan or type missing patient information and confirm the information at the central station in the Patient ID Setup window.

Once the information is confirmed, the patient's window borders and icons change to the green, "patient monitoring OK" state. If the borders and icons do not turn green, another alert or patient alarm is occurring.

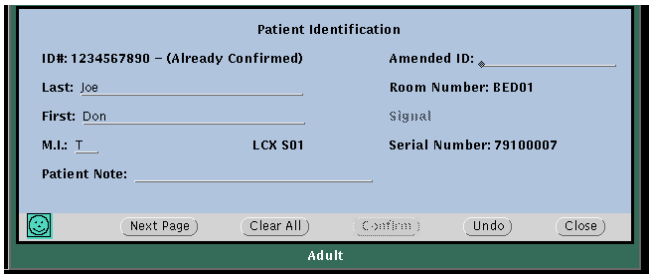
To enter patient information

At the Acuity Central Station screen, hardwired monitors are identified by room number, and wireless monitors are identified by their serial numbers.

Note The Acuity System does not accept these scanned items: Double quotation marks, middle names (one middle initial is accepted) and spaces and periods.

1. Click the patient's RM or ID icon in the patient's Waveform Window or on the map.

   The Patient ID Setup windows appear.



Patient ID window 1

2. Scan or type the patient's ID number in the ID# field.
3. Press the Tab or Enter key on your keyboard to advance a line.

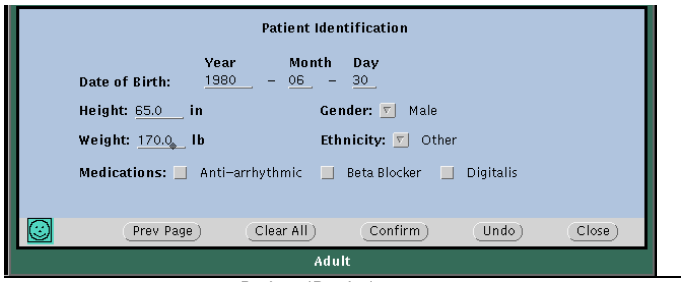
   If you are prompted, this patient ID was pre-entered via the hospital central information system, the Acuity Patient List window, a wireless monitor, or a mobile device running AcuityLink Clinician Notifier software.

   If the prompt information is correct, click **Accept** and other information fills in.
4. If necessary, scan or type the patient's name, and press Tab or Enter to advance.
5. If necessary, scan or type the room number.

   Up to five characters, including numbers, letters and dashes, are accepted.
6. Check the listed patient monitor model and serial number to ensure that they indicate your patient's monitor.

7. Click **Next Page** to enter additional patient demographics such as date of birth, gender, height, weight, ethnicity, and medications.

   The second page of the Patient ID setup window appears.



Patient ID window 2

To confirm the patient

1. *Carefully review your entries for accuracy.*
2. Click **Confirm**.

   If a prompt appears telling you that the same ID number has been previously used, carefully review the ID number, and then take one of these steps:

   - Click **Do Anyway** to confirm the ID with the name that you have entered.

     Review data is combined.

   - Click **Go Back** to return to the Patient ID Setup window, revise the ID or name, and then click **Confirm** again.

   You have completed the patient ID confirmation process. The Acuity System sends unit default alarm limits and settings to the patient monitor.

3. (Optional) Customize alarm limits. For details, see "Adjust a patient's alarm limits" on page 46.

4 Adjust monitoring settings and patient information

Set up typical monitoring at the Virtual Monitor

This table presents typical monitoring functions that you can set up at the Acuity Central Station using the Virtual Monitor.

Table 2. Typical monitoring functions at the Virtual Monitor

NIBP and SpO_2 spot checks

Task	Clicks at Virtual Monitor	Notes
Start an NIBP measurement (except for a Micropaq monitor).	1. NIBP, 2. START	Can be started also at the patient monitor.
(Propaq LT monitor) Start an SpO2 spot check measurement.	1. SpO_2, 2. START	SpO_2 Spot Mode must be turned on at the monitor.

Patient mode and alarms

(Micropaq monitor) Change the patient mode.	1. MAIN MENU 2. MORE 3. MORE 4. NEXT 5. CHANGE	You can change a Micropaq monitor's patient mode only at the Acuity Central Station. For all other patient monitors, you can change patient mode only at the patient monitor. **WARNING** Always check patient mode in the border of the Waveform Window or Virtual Monitor. Incorrect patient mode can result in unsuitable alarm settings, inaccurate heart rate readings and inappropriate arrhythmia and ST-segment analyses.
Temporarily suppress the potential for audible alarm tones.	1. SUSPEND 2. When ready to return to normal monitoring: RESUME	Although any alerts for this patient are displayed, SUSPEND suppresses alert *tones* for 90 seconds.

Table 2. Typical monitoring functions at the Virtual Monitor

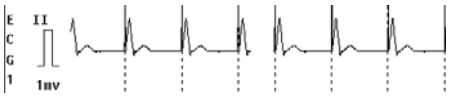
Task	Clicks at Virtual Monitor	Notes
Response time: SpO_2 and CO_2		
(Propaq Encore and CS monitors) Set SpO_2 response time.	1. SpO2 or SpO2/CO2 2. SpO2 3. MORE 4. RESPONSE	Can be changed also at the patient monitor.
(Propaq Encore and CS monitors) Set CO_2 response time.	1. SpO2/CO2 2. CO2 3. MORE 4. RESPONSE	Can be changed also at the patient monitor.
Waveforms and pacer display		
Adjust sweep speed of all waveforms except CO_2 and RESP.	1. MAIN MENU 2. MORE 3. MORE 4. NEXT 5. CHANGE	Waveform sweep speed changes in the Virtual Monitor and Waveform Window. You can adjust RESP sweep speed separately in this window, and CO_2 sweep speed changes with it.
Optimize all displayed waveform scales (except CO_2).	1. MAIN MENU 2. MORE 3. STATSCALE	Waveforms are adjusted for best display in the Virtual Monitor and Waveform Window.
Turn on or turn off the pacer display.	No Arrhythmia Analysis option: 1. ECG or ECG/RESP 2. MORE, (MORE), (MORE) 3. NEXT 4. CHANGE Arrhythmia Analysis option: 1. Setup 2. Arrhythmia Alarms 3. Pacer Display Also set Analyze Pacer for arrhythmia monitoring. For instructions, please see page 62.	 The pacer display is shown as a dashed line in the waveform areas of the Virtual Monitor, Waveform Window and Waveforms Review window. **WARNING** Keep *all* pacemaker patients under close observation. Rate meters might continue to count the pacemaker rate during occurrences of cardiac arrest or some arrhythmias. Do not rely solely upon rate meter alarms. **WARNING** Always turn on Analyze Pacers for paced patients, and always turn off Analyze Pacers for non-paced patients. The Acuity System analyzes arrhythmias based on whether the Analyze Pacers setting is on or off. The Analyze Pacers setting is Off by default.

Table 2. Typical monitoring functions at the Virtual Monitor

Lead selection: ECG and respiration

Task	Clicks at Virtual Monitor	Notes
Change the RESP lead.	1. ECG/RESP 2. MORE 3. RESP LEAD	Lead indicators are shown in the respiration waveform areas of the Virtual Monitor and Waveform Window.
Select or change ECG lead for display. Note: If a Virtual Monitor represents a Propaq Encore, Propaq CS or Welch Allyn 1500 Patient Monitor, the leads that you select for ECG 1 and ECG 2 are used also for arrhythmia analysis. For details regarding leads used for arrhythmia and ST-segment analyses, for all types of patient monitors, see Table 35 on page 187 and Table 36 on page 189.	1. ECG or ECG/RESP 2. ECG1 LEAD 3. ECG2 LEAD	**Available leads:** Monitors using 5-lead ECG cables: Leads I, II, III, aVR, aVL, aVF and V **Lead indicators:** Indicators are shown in ECG waveform areas of each patient's Virtual Monitor and Waveform Window, and in the Wave Select status window. If you want to review waveforms from all leads, view the patient's Waveforms Review window. For instructions, see page 102. **Propaq Encore, and Propaq CS monitors--changing leads when they are using two lead vectors:** If you change the ECG1 Lead from a V lead to a limb lead, the ECG2 Lead changes to a V lead. If you change the ECG1 Lead from a limb lead to a V Lead, the ECG2 Lead changes to Lead II. **Welch Allyn 1500 Patient Monitor, Propaq LT monitor--leads shown at Acuity System and patient monitor:** Select the same leads at both places to view ECG information from the same leads in both places. A lead failure for Propaq LT monitor patients can result in lead selections that are different at the Acuity Central Station.

WARNING Ensure these things to minimize false HR, Arrhythmia Analysis and ST Analysis alarms, and to achieve optimal event detection and analysis:
- ECG cable, lead wires and electrodes are undamaged.
- Patient's skin is properly prepared.
- Electrodes are placed using standard good practices.
- 5-wire ECG cable is used. A 3-wire cable limits arrhythmia and ST-segment analyses to a single lead, and ST analysis is disabled when a lead failure occurs.
- LL electrode is connected. Otherwise, only one ECG lead is available and arrhythmia and ST-segment analyses are effected.
- Patient monitor and Virtual Monitor display these things:
  -HR numeric and ECG waveform
  -Non-noisy signal. If signal is noisy, reduce patient movement and increase distance from other electrical devices.
  -Correct patient mode for the patient
- Virtual Monitor ECG 1 and ECG 2 display these things:
  -ECG waveform
  -Waveform amplitude at least 160 µV, peak-to-peak
  -QRS complex amplitude at least twice the P or T wave amplitude

WARNING Minimize patient movement during a RELEARN, as movement creates noise during the reading. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm. Ensure that the patient remains still for 5 minutes after the RELEARN before allowing them to move.

Adjust a patient's alarm limits

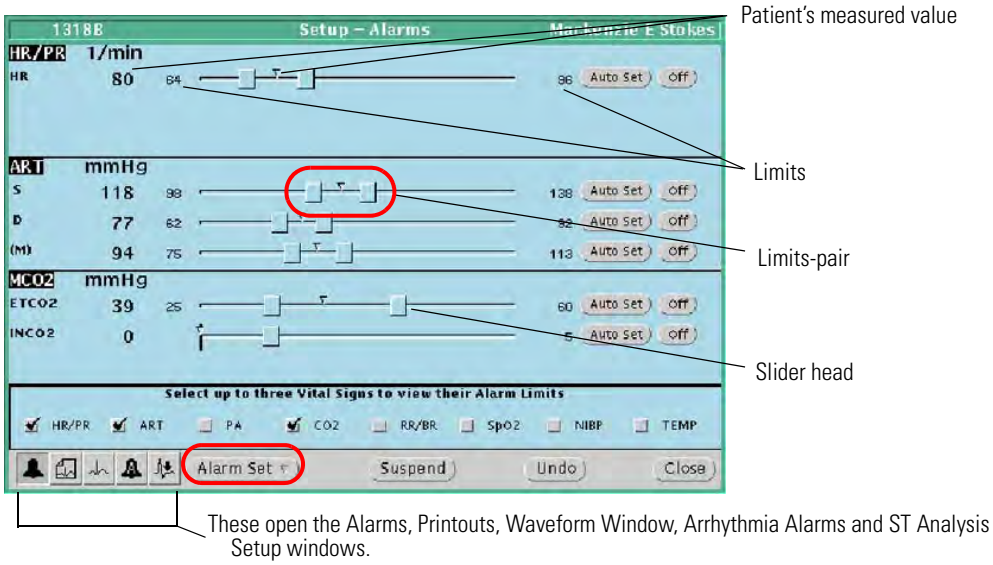
In the Alarms Setup window, you can adjust a patient's alarm limits individually or as a group.

WARNING Before you set customized alarm limits for a patient, confirm the patient's ID and room number. Otherwise, customized limits might be lost.

To adjust a patient's alarm limits

1. In the patient's Virtual Monitor, click **Setup**, **Alarms**.

   The Alarms Setup window appears.



2. Check vital-sign boxes along the bottom of the screen to view corresponding alarm limits.
3. Adjust alarm limits in one of these ways:
   - Adjust limits for one vital sign at a time.

     Click **On** or **Off** next to the limits-pair to turn on or turn off the pair.

     Click and move a slider head to set or turn off a lower or upper limit.

     Click **Auto Set** to set a limits-pair close to the patient's current vital-sign values.
   - Reset limits for all vital signs at once.

     Click **Alarm Set**, and then click one of these options:

     Stat Set sets all limits based on the patient's current vital-sign values.

     Presets sets all limits to preset values. For details, see Table 34 on page 186.

     All Alarms On turns on any limits that are off, with the values that they last held.

Important considerations: adjusting alarm limits

WARNING Patients for whom alarming has been turned off must be kept under close physical surveillance. Turning off alarming disables both audio and visual alarm indicators.

WARNING Do not use Stat Set or Auto Set for a patient in an alarm state! Use these buttons only when your patient's vital sign values are in an acceptable range.The buttons adjust alarm limits based on the patient's current vital-sign values.

WARNING Always check alarm limits when a monitor reestablishes communication with the Acuity System. If you change limits at a monitor while it is not communicating with the Acuity System (for example, during transport or signal dropout), when you reestablish communication with the system, the limits might change to Acuity System Presets values.

WARNING Minimize patient movement during a RELEARN, as movement creates noise during the reading. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm. Ensure that the patient remains still for 5 minutes after the RELEARN before allowing them to move.

Adjust general printing settings

This section presents information about these tasks:

- Setting preferences for a patient's Acuity Central Station vital-signs printouts.
- Coordinating printers and print jobs for the *entire* Acuity System.

If you want to set these preferences instead, see these pages:

- For arrhythmia event alarm printing, see "Adjust preferences for a patient's arrhythmia alarming" on page 61.
- For ST-segment deviation alarm printing, see "Set alarm preferences for ST Analysis" on page 74.

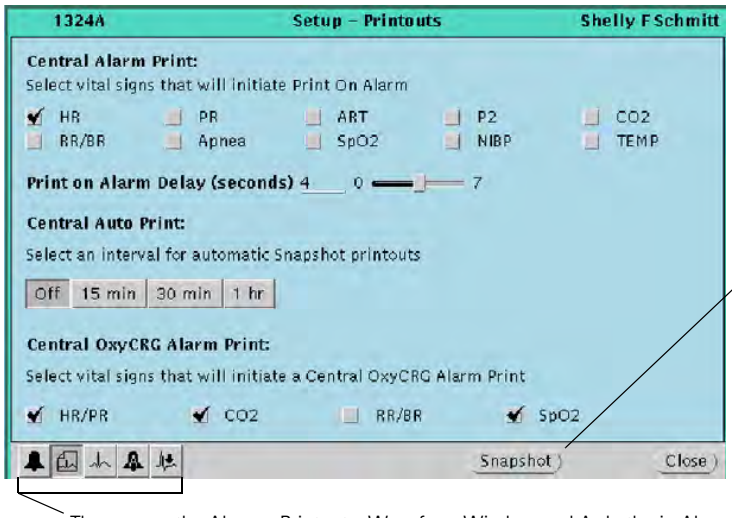
Adjust preferences for a patient's central station printouts

This section presents the Printouts Setup window, in which you can specify details regarding automatic central station printouts.

To adjust preferences for a patient's printouts

1. In the patient's Virtual Monitor, click **Setup**, **Printouts**.

   The Printouts Setup window appears.



Prints a Snapshot printout at the Acuity Central Station.

These open the Alarms, Printouts, Waveform Window and Arrhythmia Alarms and ST Analysis Setup windows.

2. Set preferences in these areas of the window:

   - Central Alarm Print: Check a vital-sign box to set automatic printing of an alarm print if an alarm occurs for that vital-sign.
   - Print on Alarm Delay: Move the slider to set the time delay (in seconds) between an alarm and the onset of an alarm printout.

     If the duration of an alarm is shorter than this delay period, no alarm print is generated.
   - Central Auto Print: Click an interval for automatic snapshot printouts (Auto Prints) to occur.
   - Central OxyCRG Alarm Print: Check a vital-sign box to set automatic printing of an OxyCRG print if an alarm occurs for that vital sign.

     OxyCRG printouts combine HR/PR, CO_2, RR/BR and SpO_2 vital signs, if active.

Note On some monitors, RR/BR is labeled RRECG/RRCO2. RR and RRECG are respiration rates derived from ECG, while BR and RRCO2 are respiration rates derived from CO_2.

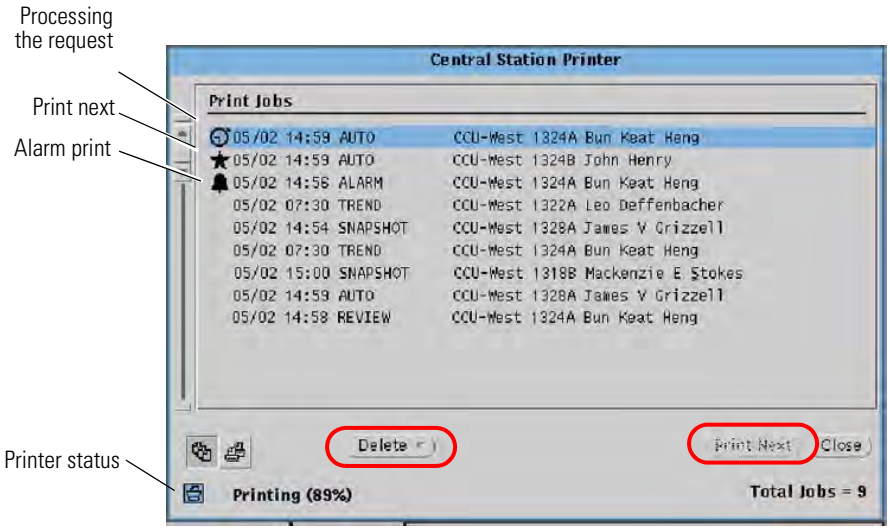
Coordinate system print jobs and central station printers

This section presents the Acuity Central Station Printer window, from which you can coordinate printers and pending print jobs for the entire Acuity System.

To coordinate print jobs

1. On the Acuity Central Station map where the Acuity Central Station icon is located, click .

   The Print Jobs view of the Central Station Printer window appears.


Processing the request
Print next
Alarm print
Printer status
Central Station Printer
Print Jobs
05/02 14:59 AUTO CCU-West 1324A Bun Keat Heng
05/02 14:59 AUTO CCU-West 1324B John Henry
05/02 14:56 ALARM CCU-West 1324A Bun Keat Heng
05/02 07:30 TREND CCU-West 1322A Leo Deffenbacher
05/02 14:54 SNAPSHOT CCU-West 1328A James V Grizzell
05/02 07:30 TREND CCU-West 1324A Bun Keat Heng
05/02 15:00 SNAPSHOT CCU-West 1318B Mackenzie E Stokes
05/02 14:59 AUTO CCU-West 1328A James V Grizzell
05/02 14:58 REVIEW CCU-West 1324A Bun Keat Heng
Delete
Print Next
Close
Printing (89%)
Total Jobs = 9

2. Click a print job to highlight it.
3. Click any of these buttons:
   - Click **Print Next** to print the job next.
   - Click **Delete**, and then **Delete Selection** to delete the print job.

Note If appears beside a print job, see Table 18 on page 159 for troubleshooting information.

To coordinate printers

1. Click .

   The Printers View appears.

2. Do any of these things:
   - Read messages to check printer status.
   - Click a printer to highlight it, and then click **Disable** to disable the printer or **Enable** to enable the printer.

Adjust a patient's waveform displays

You can select waveforms for display in a patient's Virtual Monitor and Waveform Window.

To adjust waveform displays for a patient's Virtual Monitor

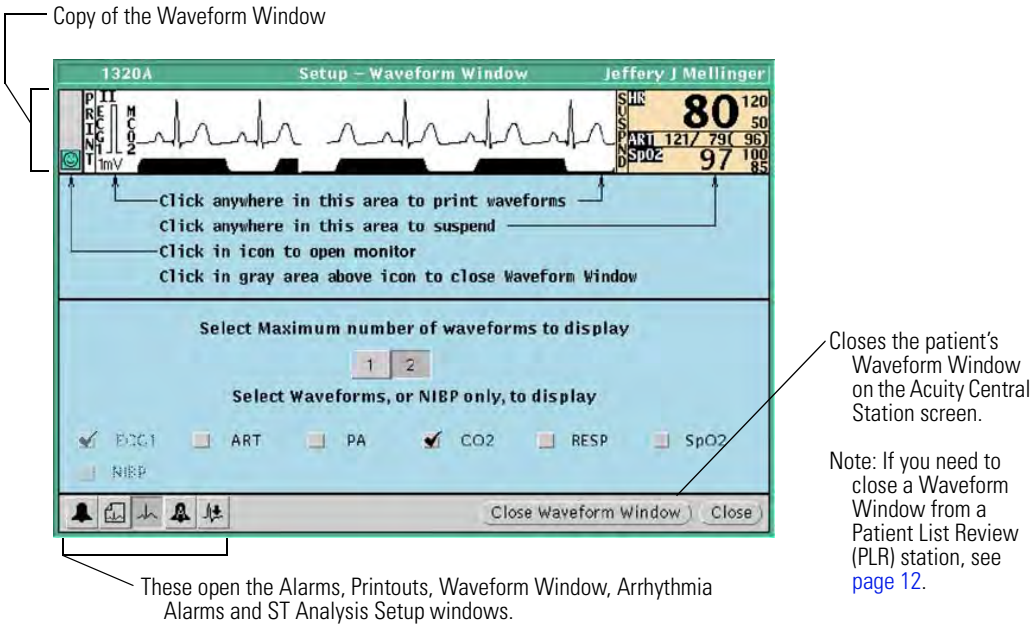
You can select or deselect up to three vital-sign waveforms for viewing.

1. In the patient's Virtual Monitor, click **MAIN MENU**, **MORE**, **WAVE SEL**.
2. Click **NEXT** to highlight a waveform.
3. Click **ON/OFF**.

To adjust waveform displays for a patient's Waveform Window

1. In the patient's Virtual Monitor, click **Setup**, **Waveform Window**.

   The Waveform Window Setup window appears.


Copy of the Waveform Window
1320A
Setup – Waveform Window
Jeffery J Mellinger
Click anywhere in this area to print waveforms
Click anywhere in this area to suspend
Click in icon to open monitor
Click in gray area above icon to close Waveform Window
Select Maximum number of waveforms to display
1
2
Select Waveforms, or NIBP only, to display
ECG1
ART
PA
CO2
RESP
SpO2
NIBP
Close Waveform Window
Close
Closes the patient's Waveform Window on the Acuity Central Station screen.
Note: If you need to close a Waveform Window from a Patient List Review (PLR) station, see page 12.
These open the Alarms, Printouts, Waveform Window, Arrhythmia Alarms and ST Analysis Setup windows.

2. Click **1** or **2** to select the number of waveforms to display in the Waveform Window.
3. Check a vital-sign box to display a waveform.

   If ECG is monitored, it is always displayed and cannot be deselected.

   NIBP is selected for display if it is the only vital sign monitored.

Arrhythmia Analysis option

The Acuity System Arrhythmia Analysis module analyzes patient ECG data to detect specific changes in cardiac rhythms. The system uses up to three ECG leads to detect normal beats, ventricular beats and to analyze arrhythmias.

The Arrhythmia Analysis options are not intended for use on neonatal patients, and arrhythmia analysis is disabled in the Neonate mode.

Arrhythmia Analysis terms

These terms are used throughout this section:

alarm level. A setting that indicates an individual arrhythmia type's priority and associated audible alarm tone. Alarm level designations can be lethal, high, medium, low, or off.

arrhythmia alarm limit. An appropriate numeric threshold for an arrhythmia type.

arrhythmia type. A specific arrhythmia category.

artifact. A disturbance or movement of the patient or sensors that adds errors to measured parameters. Caused by muscle movement or shivering, electrical interference, or vibration.

event. The occurrence of an arrhythmia event, arrhythmia or ST-segment relearn event, learning done event or snapshot printout event.

event marker. A notation that indicates the time when an event occurred. Event markers appear in most review windows and in some printouts. Event notations are ♥ for arrhythmia alarms, ♥ for arrhythmia events, and ▼ for relearn and snapshot events.

lethal arrhythmia. The Acuity System defines VFib (ventricular fibrillation), asystole, and VTach (ventricular tachycardia) as lethal arrhythmias. In the Arrhythmia Alarms Setup window, the alarm level for these arrhythmia types is permanently set to LETHAL, and alarming cannot be turned off.

PVC. Premature ventricular contraction.

relearn. An Arrhythmia Analysis function that causes the Acuity system to relearn a patient's normal ECG rhythm. The Acuity System uses the relearned rhythm as a guideline to identify arrhythmia events (arrhythmia relearn) and to analyze deviation of the ECG ST-segment offset (ST relearn).

When relearn occurs for a patient

Both arrhythmia and ST relearn events occur after these things:

- ST/Arr Relearn is clicked in the Arrhythmia Alarms Setup window.
- Single ECG is clicked in the Arrhythmia Alarms Setup window
- Patient connection, some lead changes or lead failures, system restart

Only an arrhythmia relearn event occurs after these things:

- RELEARN is clicked in the Arrhythmia Alarms Setup window. A RELEARN button (instead of an ST/Arr Relearn button) indicates that the system does not include the ST Analysis option.
- Analyze Pacers is clicked in the Arrhythmia Alarms Setup window. ST Analysis is disabled when Analyze Pacers is enabled.

Only an ST relearn event occurs after this:

- ST RELEARN is clicked in the ST Analysis Setup window.

WARNING Minimize patient movement during a RELEARN, as movement creates noise during the reading. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm. Ensure that the patient remains still for 5 minutes after the RELEARN before allowing them to move.

What occurs in a patient's windows during and after a relearn event

- Virtual Monitor and Waveform Window: In all instances except clicking ST RELEARN, a visual RELEARN alert occurs. HR is taken from the patient monitor instead of from the arrhythmia software, and real-time waveforms display as usual.
- ST Analysis Setup window: The waveform slice displays NO VALID BEATS, and the Acuity System can take up to 30 seconds to update the waveform.
- Most review windows and some printouts: Relearn and Learning Done event markers (▼) appear.

Arrhythmia event definitions

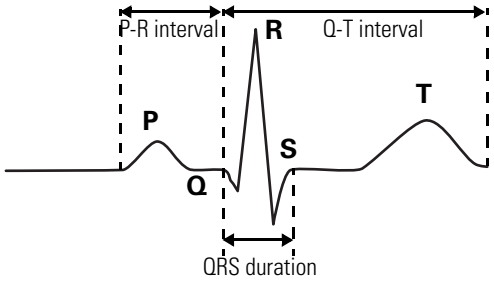
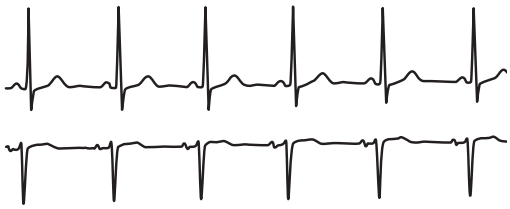
The Acuity System Arrhythmia Analysis module is not an atrial arrhythmia analysis package.

Depending upon which arrhythmia analysis option that your Acuity System includes, your system detects one of these groups of arrhythmia types:

- Lethal Arrhythmia Analysis option: The system detects only lethal arrhythmias (VFib, asystole and VTach).
- Full Arrhythmia Analysis option: The system detects lethal arrhythmias (VFib, asystole and VTach) and all of the arrhythmia types shown in Table 5 on page 56.

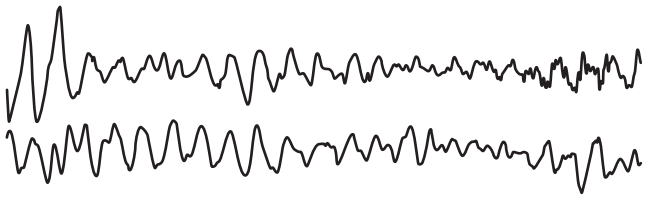
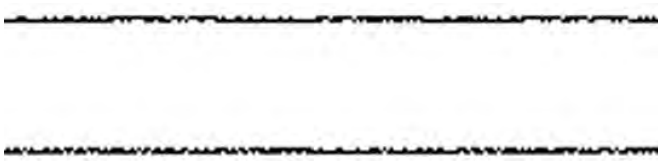
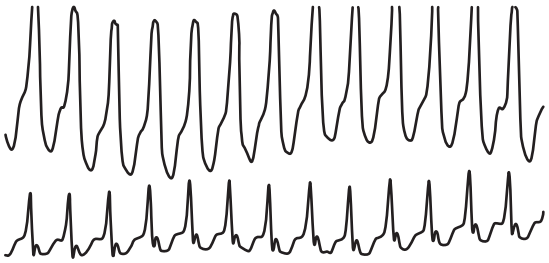
Normal sinus rhythm

Table 3. Normal sinus rhythm

QRS	Normal sinus rhythm example
	

Lethal Arrhythmia Analysis option: events detected

Table 4. Definitions of lethal arrhythmia events[a]

Arrhythmia event and definition	Waveform example
VFib [b](ventricular fibrillation) Chaotic quivering of the ventricles accompanied by rapid irregular waves but no formed QRS complexes.	
Asystole Absence of any detected beat for 4 or more seconds.	
VTach (ventricular tachycardia) A run of premature ventricular beats that exceeds the PVC run alarm limit and that meets or exceeds the patient's VTach alarm limit. **Note**: The American Heart Association describes sustained and nonsustained ventricular tachycardia as follows: Ventricular tachycardia can be referred to as sustained or nonsustained. Sustained refers to an episode that lasts at least 30 seconds and generally requires termination by antiarrhythmia drugs, antitachycardia pacing techniques or electrical cardioversion. Nonsustained ventricular tachycardia suggests that the episodes are short (three beats or longer) and terminate spontaneously.	

a. Alarming for lethal arrhythmias cannot be turned off.

b. VFib is detected within 6 seconds if the waveform fulfills these conditions:
   - Absence of fast slew-rate activity (QRS-like activity)
   - Wave rate higher than 130 bpm
   - Average peak-to-peak wave amplitude higher than 200 µV
   - Wave period variance higher than a specific threshold

Full Arrhythmia Analysis option: additional events detected

Table 5. Full Arrhythmia Analysis option: events detected in addition to lethal events

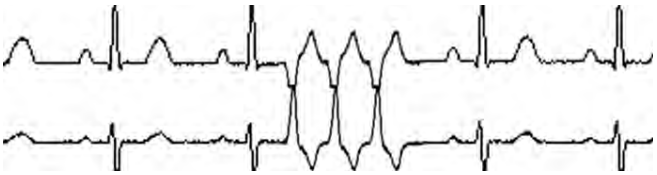
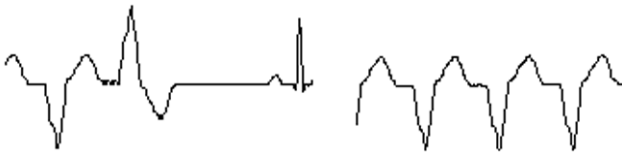
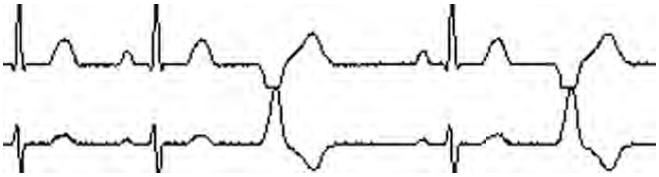
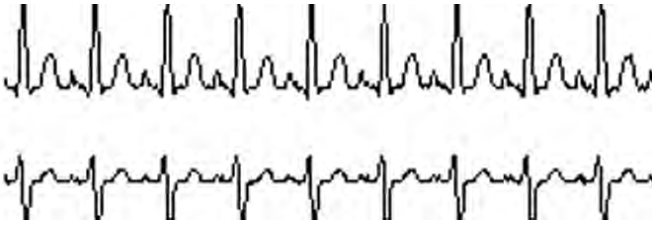
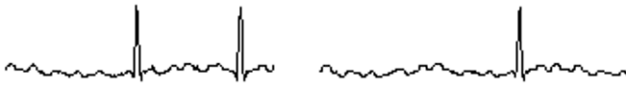
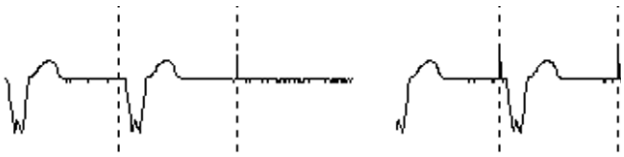
Arrhythmia event and definition	Waveform example
PVC run (ventricular run) A run of three to six consecutive, premature ventricular beats that meets or exceeds the patient's VTach alarm limit.	
VRhythm (ventricular rhythm) A run of successive ventricular beats that is less than the V Tach alarm limit, and the number of successive ventricular beats is greater than or equal to three.	
Couplet Two consecutive ventricular beats that are preceded and followed by a normal beat.	
PVC/min Premature ventricular beats that are greater or equal to the patient's PVC/min alarm limit.	
Bigeminy Three or more successive cycles consisting of a normal beat followed by a premature ventricular beat. Bigeminy is independent of the average heart rate.	
Trigeminy Three or more successive cycles of two normal beats followed by a premature ventricular beat. Trigeminy is independent of the average heart rate.	
Tachycardia A HR greater than or equal to the patient's tachycardia alarm limit. If the tachycardia limit is decreased past the HR high limit, the HR high limit will decrease to a value equal to the tachycardia limit.	

Table 5. Full Arrhythmia Analysis option: events detected in addition to lethal events

Arrhythmia event and definition	Waveform example
Bradycardia A HR less than or equal to the patient's bradycardia alarm limit. If the bradycardia limit is increased past the HR low limit, the HR low limit will increase to a value equal to the bradycardia limit.	
Pause The R-to-R interval that is greater than or equal to two times the average R-to-R.	
Irregular (irregular rhythm) An irregularity in the R-to-R interval over a series of at least 16 non-ventricular beats.	
NonCapture (pacemaker noncapture) For pacemaker patients with the Analyze Pacers option enabled, a beat does not directly follow a pacer.	

Open an Arrhythmia Alarms Setup window

In the Arrhythmia Alarms Setup window, you can adjust some or all these preferences for a patient, depending on your Arrhythmia Analysis option:

- Turn off alarming for all arrhythmia types except the lethal arrhythmias (VFib, asystole and VTach).
- Adjust alarm limits for one arrhythmia type at a time or set all arrhythmia limits to Presets values.
- Adjust alarming preferences (alarming level priority, minimum duration that an irregular rhythm arrhythmia must occur for alarming, and Print on Alarm).
- Set special preferences for patients with pacemakers.
- Initiate relearn of a patient's ECG rhythm for arrhythmia and ST-segment analyses.

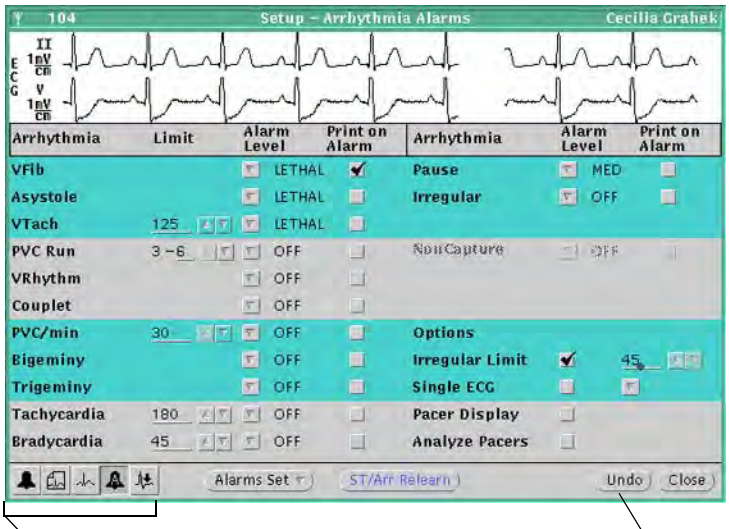
WARNING Before you set customized alarm limits for a patient, confirm the patient's ID and room number. Otherwise, customized limits might be lost.

To open an Arrhythmia Alarms Setup window

- In the patient's Virtual Monitor, click **Setup**, **Arrhythmia Alarms**.

  The Arrhythmia Alarms Setup window appears.

  If your window appears abbreviated, your system includes the Lethal Arrhythmia Analysis option (lethal arrhythmia detection, only).



These open the Alarms, Printouts, Waveform Window, Arrhythmia Alarms and ST Analysis Setup windows.

Undoes what has been done since the window was opened, except relearn.

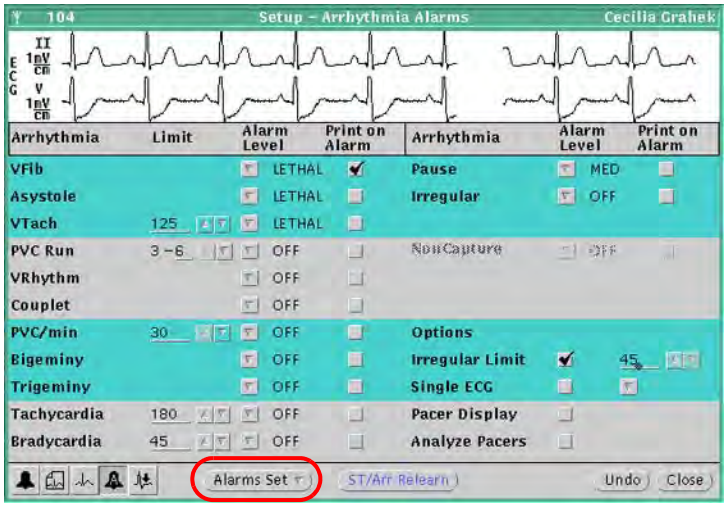
Turn off alarming for all arrhythmia types except lethal arrhythmias

WARNING Turning off alarming for arrhythmia types and ST Analysis disables both audio and visual alarm indicators. Although alarming for lethal arrhythmias cannot be turned off, patients susceptible to arrhythmias must be kept under close physical surveillance if their alarming has been turned off for any arrhythmia types.

To turn off alarming for all arrhythmia types except lethal arrhythmias (VFib, asystole and VTach)

1. In the patient's Virtual Monitor, click **Setup**, **Arrhythmia Alarms**.

   If your window appears abbreviated, your system detects lethal arrhythmias only. Alarming for lethal arrhythmia types cannot be turned off.



2. Click **Alarms Set**, **Arrhythmia Off**.

   In the patient's review windows, arrhythmia event markers appear as ♥. However, lethal arrhythmia events still appear as ♥.

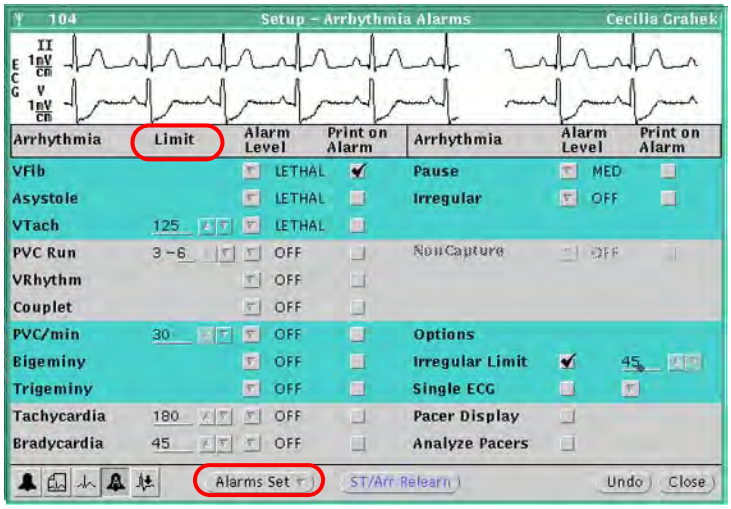
Adjust a patient's arrhythmia alarm limits

WARNING If you set the bradycardia alarm limit higher than the HR lower limit, the Acuity System adjusts the HR lower limit to the new bradycardia limit. If you set the tachycardia limit lower than the HR upper limit, the Acuity System sets the HR upper limit to the new tachycardia limit. In either case, a message appears in the upper border of the Arrhythmia Alarms Setup window telling you HR alarm limits have changed.

WARNING Minimize patient movement during a RELEARN, as movement creates noise during the reading. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm. Ensure that the patient remains still for 5 minutes after the RELEARN before allowing them to move.

To adjust a patient's arrhythmia alarm limits

1. In the patient's Virtual Monitor, click **Setup**, **Arrhythmia Alarms**.



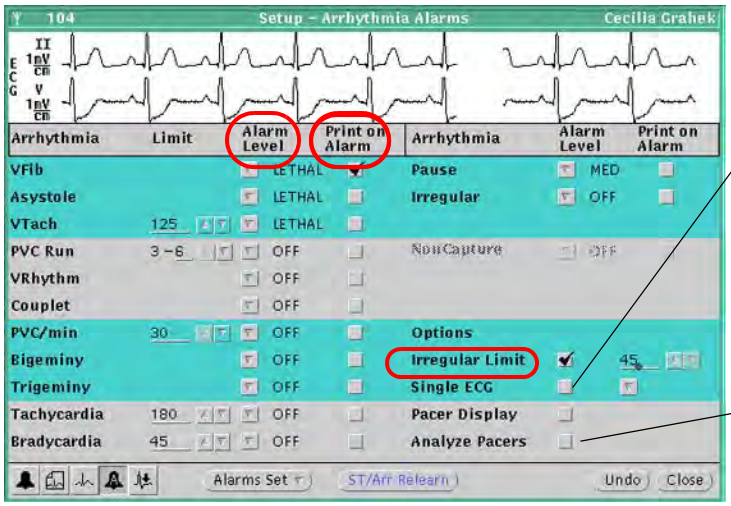
2. Set alarm limits in one of these ways:
   - In the Limit column, click the arrows next to the arrhythmia type to set alarm limits for one arrhythmia type at a time.
   - Click **Alarms Set**, **Presets** to set all arrhythmia limits to preset values.

     For Presets values, see Table 35 on page 187.
3. If the patient has a pacemaker, see "To set additional arrhythmia analysis preferences for a pacemaker patient" on page 62.

Adjust preferences for a patient's arrhythmia alarming

To adjust preferences for a patient's arrhythmia alarming

1. In the patient's Virtual Monitor, click **Setup**, **Arrhythmia Alarms**.



Single ECG enables you to select one lead for arrhythmia analysis. This is useful if false alarms occur because of a patient's unique beat morphology. For details, see Table 14 on page 152.

Always turn *off* Analyze Pacers for non-paced patients.

2. Adjust preferences for alarming.

   - Alarm Level: To specify the alarming priority for an arrhythmia type, click the arrow next to the arrhythmia, and then select an alarm level.

     If an alarm level is set to off and an event of that type occurs, ♥ appears in the patient's review windows.

     For a description of alarm levels, see Table 6 on page 94.

WARNING Turning off alarming for arrhythmia types and ST Analysis disables both audio and visual alarm indicators. Although alarming for lethal arrhythmias cannot be turned off, patients susceptible to arrhythmias must be kept under close physical surveillance if their alarming has been turned off for any arrhythmia types.

WARNING Minimize patient movement during a RELEARN, as movement creates noise during the reading. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm. Ensure that the patient remains still for 5 minutes after the RELEARN before allowing them to move.

   - Irregular limit (under Options): To adjust the minimum duration that an irregular rhythm arrhythmia must occur before the Acuity System alarms, click an arrow to specify seconds, and then check the Irregular Limit box.
   - Print on Alarm: To specify that central station alarm printouts occur for a specific arrhythmia type alarm, check the Print on Alarm box next to the arrhythmia type.

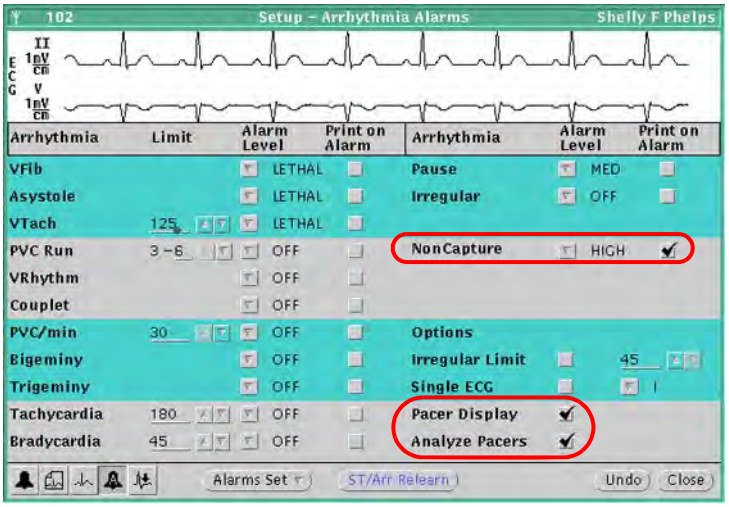
3. If the patient has a pacemaker, see "To set additional arrhythmia analysis preferences for a pacemaker patient" on page 62.

Set additional arrhythmia analysis preferences for a pacemaker patient

WARNING Always turn on Analyze Pacers for paced patients, and always turn off Analyze Pacers for non-paced patients. The Acuity System analyzes arrhythmias based on whether the Analyze Pacers setting is on or off. The Analyze Pacers setting is Off by default.

To set additional arrhythmia analysis preferences for a pacemaker patient

1. In the patient's Virtual Monitor, click **Setup**, **Arrhythmia Alarms**.



2. Carefully evaluate the patient's current rhythm to ensure that you want the Acuity System to relearn it as the patient's normal ECG rhythm.

   A relearn occurs in the next step.

3. Check the **Analyze Pacers** box to enable specialized arrhythmia analysis.

   Pacer Display is turned on also. If you prefer not to view the pacer display, clear the Pacer Display box.

   A RELEARN alert occurs at the patient's Virtual Monitor and Waveform Window. The alert remains until relearn is finished.

4. Carefully evaluate the new ECG rhythm to ensure that the Acuity System has learned an appropriate rhythm. For evaluation instructions, see "Respond to a RELEARN alert" on page 90.

5. If Noncapture is listed in the arrhythmia list, set an Alarm Level and Print on Alarm for pacemaker noncapture.

WARNING Keep *all* pacemaker patients under close observation. Rate meters might continue to count the pacemaker rate during occurrences of cardiac arrest or some arrhythmias. Do not rely solely upon rate meter alarms.

Initiate relearn of a patient's ECG rhythm

Description of the relearn function

Relearn is an Arrhythmia Analysis function that causes the Acuity system to relearn a patient's normal ECG rhythm. The Acuity System uses the relearned rhythm as a guideline to identify arrhythmia events (arrhythmia relearn) and to analyze deviation of the ECG ST-segment offset (ST relearn).

When relearn occurs for a patient

Both arrhythmia and ST relearn events occur after these things:

- ST/Arr Relearn is clicked in the Arrhythmia Alarms Setup window.
- Single ECG is clicked in the Arrhythmia Alarms Setup window
- Patient connection, some lead changes or lead failures, system restart

Only an arrhythmia relearn event occurs after these things:

- RELEARN is clicked in the Arrhythmia Alarms Setup window. A RELEARN button (instead of an ST/Arr Relearn button) indicates that the system does not include the ST Analysis option.
- Analyze Pacers is clicked in the Arrhythmia Alarms Setup window. ST Analysis is disabled when Analyze Pacers is enabled.

What occurs in a patient's windows during and after a relearn event

- Virtual Monitor and Waveform Window: A visual RELEARN alert occurs, HR is taken from the patient monitor instead of from the arrhythmia software, and real-time waveforms display as usual.
- ST Analysis Setup window: The waveform slice displays NO VALID BEATS, and the Acuity System can take up to 30 seconds to update the waveform.
- Most review windows and some printouts: Relearn and Learning Done event markers (▼) appear.

WARNING Minimize patient movement during a RELEARN, as movement creates noise during the reading. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm. Ensure that the patient remains still for 5 minutes after the RELEARN before allowing them to move.

WARNING In Acuity Systems that include an Arrhythmia option, a relearn function causes the system to learn a patient's normal ECG rhythm. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as a normal. Thereafter, rhythms of this type might not trigger an alarm.

A relearn event can be initiated by a user or by the system. System relearns are in response to these circumstances:

- Patient connection
- Lead change or failure
- System restart

During an arrhythmia relearn event, the system posts a RELEARN alert in the patient's Virtual Monitor and Waveform Window. Carefully observe a patient during an Acuity System learning period. During learning, the system detects only VFib and asystole arrhythmias.

After a relearn event, "Relearn" and "Learning Done" event markers (▼) appear in most of the patient's review windows and some printouts. After relearn, carefully evaluate the new ECG rhythm and the current ST segment for all active leads to ensure that the system learned an appropriate rhythm. For evaluation instructions, see "To respond to a RELEARN alert" on page 91.

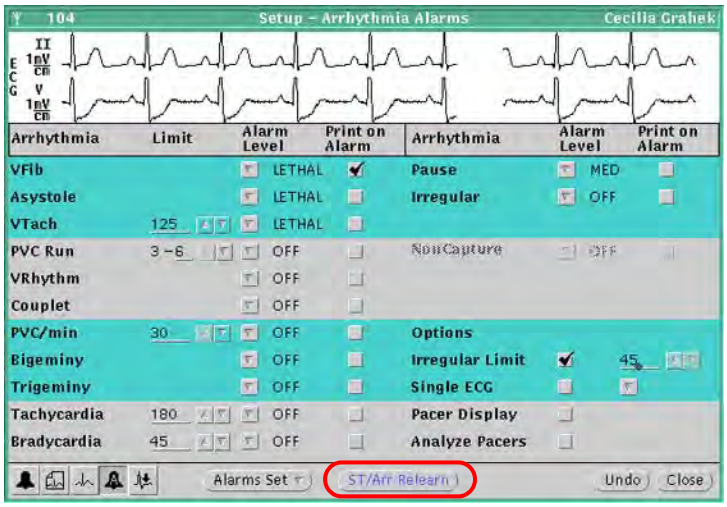
To initiate relearn of a patient's ECG rhythm for arrhythmia and ST-segment analyses

The relearn operation cannot be undone.

1. In the patient's Virtual Monitor, click **Setup**, **Arrhythmia Alarms**.

   The Arrhythmia Alarms Setup window appears.

   If your window appears abbreviated, your system includes the Lethal Arrhythmia Analysis option (lethal arrhythmia detection, only).



2. Carefully evaluate the patient's current rhythm to ensure that you want the Acuity System to establish it as the patient's normal ECG rhythm.

3. Click **ST/Arr Relearn** or **RELEARN**.

   A RELEARN alert occurs at the patient's Virtual Monitor and Waveform Window. The alert remains until relearn is finished.

4. Carefully evaluate the new ECG rhythm and ST segment to ensure that the Acuity System has learned an appropriate rhythm. For instructions, see "Respond to a RELEARN alert" on page 90.

Important considerations: Arrhythmia Analysis

Related to Arrhythmia Analysis options, patient populations and patient surveillance

WARNING The Acuity System Arrhythmia Analysis options are *not* atrial arrhythmia analysis packages: they are ventricular analysis packages. An Acuity System with the Full Arrhythmia Analysis option detects these arrhythmia types: ventricular fibrillation, asystole, ventricular tachycardia, PVC run (ventricular run), VRhythm (ventricular rhythm), couplet, PVC per minute (ventricular beats per minute), bigeminy, trigeminy, tachycardia, bradycardia, irregular (irregular rhythm), pause, and noncapture (pacemaker noncapture).

WARNING In some clinical environments and due to some physiologic differences among patients, the Acuity System might not alarm for occurrences of ventricular tachycardia, ventricular fibrillation, or asystole. For instance, asystole is defined as an absence of any detected beat for four or more seconds. Patient pathologies where indications of electrical activity continue to exist without adequate cardiac function might not be recognized as asystole.

WARNING Do not use the Arrhythmia Analysis or ST Analysis feature on neonates. The Arrhythmia Analysis and ST Analysis options are not intended for use with neonatal patients.

WARNING It is important that clinicians understand and communicate to all staff using the Acuity Central Station that any arrhythmia analysis software program is an effective tool to assist in patient care, but arrhythmia analysis packages are unable to achieve 100 percent accuracy for all morphologies and occurrences of QRS and PVC detection. Thus, close physical surveillance and clinical interpretation of cardiac data must still be an integral part of every patient's care. Clinicians must review all data obtained from the Acuity System before implementing therapy based on the data.

Related to patient monitor heart rate indications

WARNING All heart rate alarms are valid, even if the HR value at the central station differs from that at the monitor.

If your system includes an Arrhythmia Analysis option, the Acuity System heart rates for adult and pediatric patients are a result of system software analysis.

The HR/PR numeric changes to "---" in the Virtual Monitor, Waveform Window, review windows, and system printouts when the system detects ventricular fibrillation or asystole. However, an apparently valid heart rate numeric might show in the patient monitor.

Related to electrodes, leads and ECG display

WARNING If your system includes arrhythmia analysis, and if you connect, change or move an electrode, ensure that a RELEARN alert occurs at the patient monitor and the virtual monitor.

Moving or changing an electrode can change the beat morphology. If the system does not learn the new morphology, it might not alarm or it might cause false alarms. The relearn process establishes the new morphology as the normal ECG rhythm for arrhythmia and ST-segment analyses.

- If a RELEARN alert occurs after changing or moving an electrode, carefully evaluate the new ECG rhythm and the current ST segment for all active leads to make sure that the Acuity System has learned an appropriate rhythm. For evaluation instructions, see "Respond to a RELEARN alert" on page 90.
- If a RELEARN alert does not occur after changing or moving an electrode, initiate a relearn event. For instructions, see "To initiate relearn of a patient's ECG rhythm for arrhythmia and ST-segment analyses" on page 65.

WARNING Ensure these things to minimize false HR, Arrhythmia Analysis and ST Analysis alarms, and to achieve optimal event detection and analysis:

- ECG cable, lead wires and electrodes are undamaged.
- Patient's skin is properly prepared.
- Electrodes are placed using standard good practices.
- 5-wire ECG cable is used. A 3-wire cable limits arrhythmia and ST-segment analyses to a single lead, and ST analysis is disabled when a lead failure occurs.
- LL electrode is connected. Otherwise, only one ECG lead is available and arrhythmia and ST-segment analyses are effected.
- Patient monitor and Virtual Monitor display these things:
  -HR numeric and ECG waveform
  -Non-noisy signal. If signal is noisy, reduce patient movement and increase distance from other electrical devices.
  -Correct patient mode for the patient
- Virtual Monitor ECG 1 and ECG 2 display these things:
  -ECG waveform
  -Waveform amplitude at least 160 µV, peak-to-peak
  -QRS complex amplitude at least twice the P or T wave amplitude.

WARNING Carefully monitor lead-wire connections of patients prone to arrhythmia events. If a lead wire disconnects during an event, the Acuity System's ability to accurately detect the event can be compromised.

WARNING Minimize patient movement during a RELEARN, as movement creates noise during the reading. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm. Ensure that the patient remains still for 5 minutes after the RELEARN before allowing them to move.

ST Analysis option

The Acuity System ST Analysis option analyzes the ST segment of current ECG beats relative to the ST segment of a reference beat. Specifically, the system reports mm or mV of deviation between the current beat's ST-segment offset and the reference beat's ST-segment offset.

The system learns the reference beats when a learning or relearn function occurs. For a listing of when learning or relearn functions occur, see "When ST relearn occurs for a patient" on page 75.

In the ST Analysis Setup window, you can do the following things:

- Specify analysis preferences.
- Set alarm limits.
- Set ST alarming priority level.
- Set Print on Alarm.
- View current beats and reference beats.
- View current deviation values, including alarm values.
- Initiate relearn of a patient's reference beats for ST analysis only.

ST analysis is not performed in these circumstances:

- If Analyze Pacers is set on in the patient's Arrhythmia Alarms Setup window.
- If the patient monitor is set in neonate mode.
- During the occurrence of arrhythmia events.

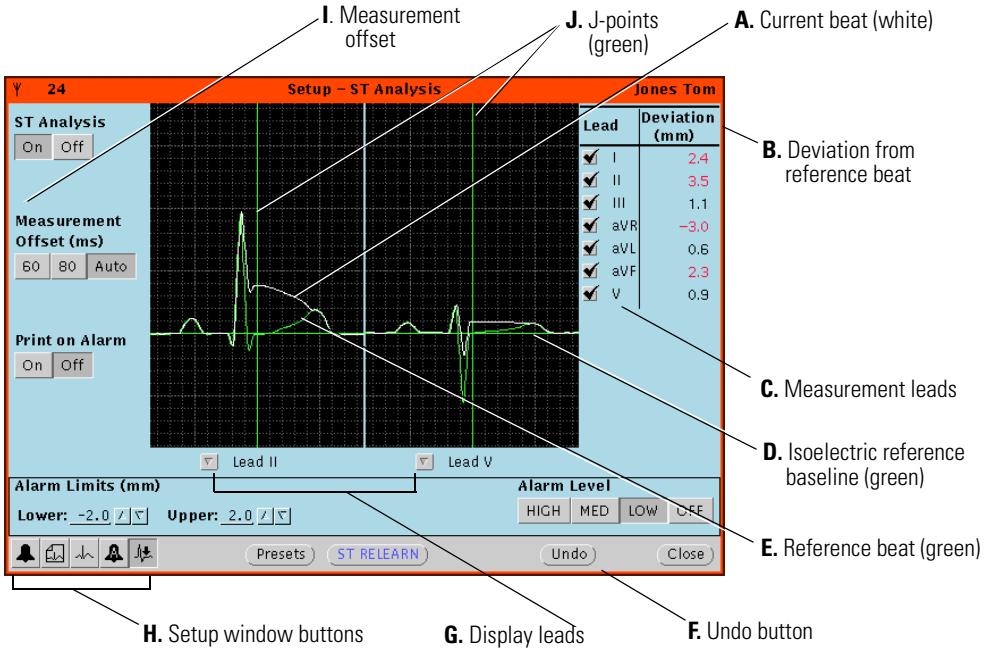
Examine the ST Analysis Setup window

The ST Analysis Setup windows in this section are shown in alarm.

To open an ST Analysis Setup window

- In the patient's Virtual Monitor, click **Setup**, **ST Analysis**.

  The ST Analysis Setup window appears.



To examine the ST Analysis Setup window

A. Current beat (white)	The current beat is shown for one or two leads.
B. Deviation from reference beat	Deviation (mm or mV) of the current ST-segment offset from the reference ST-segment offset, for each lead. Red numbers indicate alarm values.
C. Measurement leads	Analysis is performed on the selected leads.
D. Isoelectric reference baseline (green)	Horizontal line marks the isoelectric reference baseline for the ECG waveform.
E. Reference beat (green)	The reference beat is learned when the Acuity System learning or relearn function occurs.
F. Undo button	Undoes what has been done since the window was opened, except ST RELEARN and measurement Lead choices.
G. Display leads	One or two active leads can be displayed.
H. Setup window buttons	Open Alarms, Printouts, Waveform Window, Arrhythmia Alarms and ST Analysis Setup windows.

I. Measurement offset	The point at which the ST-segment analysis is performed, as determined by the number of ms or mV after the J-point.
J. J-points (green)	Vertical green reference line intersects each beat at the J-point, the end of QRS and the start of the ST segment.

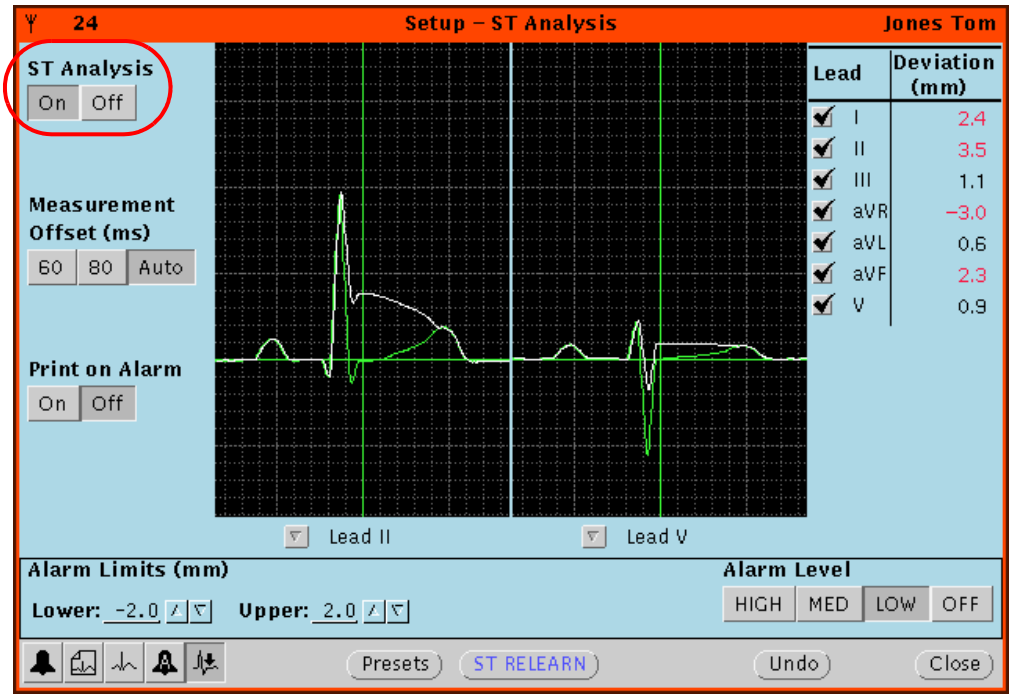
Turn on or off ST analysis

WARNING If a patient's ST analysis is turned off, the patient's ECG is not analyzed for ST-segment deviations. ST alerts or alarms are not generated, and ST information is not stored as graphical trends. The Acuity System can be configured to set ST analysis to Off as a default setting. For further information, see your system administrator.

To turn on or off ST analysis

1. In the patient's Virtual Monitor, click **Setup**, **ST Analysis**.

   The ST Analysis Setup window appears.



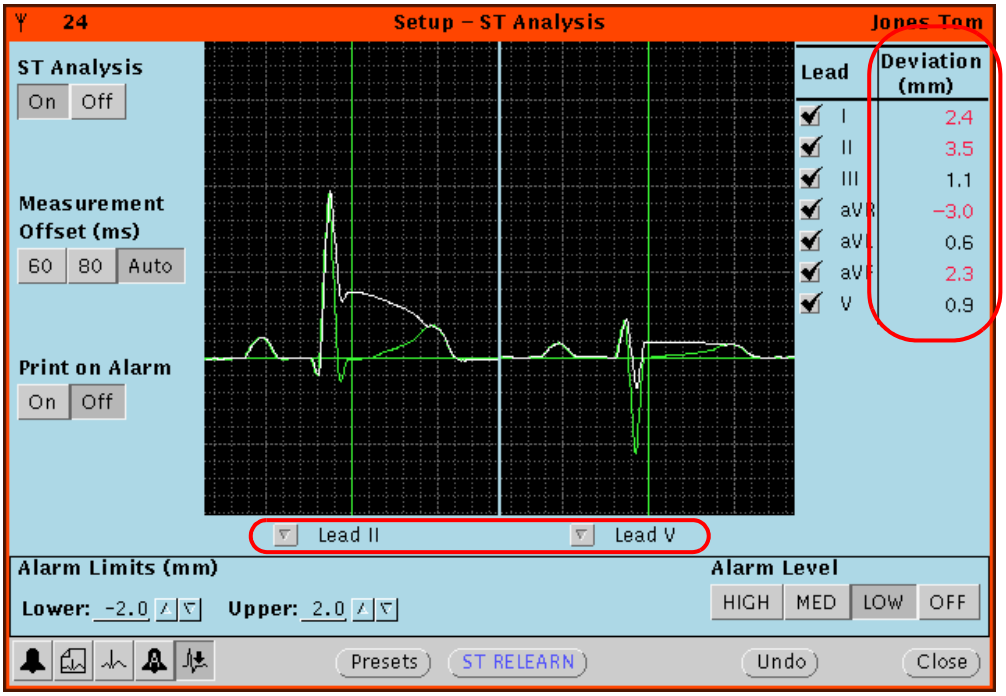
2. Click **On** or **Off** in the ST Analysis area.

View current beats and ST-segment deviation values

To view current beats and ST-segment deviation values

1. In the patient's Virtual Monitor, click **Setup**, **ST Analysis**.

   The ST Analysis Setup window appears.



2. Beneath the waveforms, click the arrows to select the leads used for one or both lead displays.

3. View current ST-segment deviation values in the Deviation column.

   Alarm values are red.

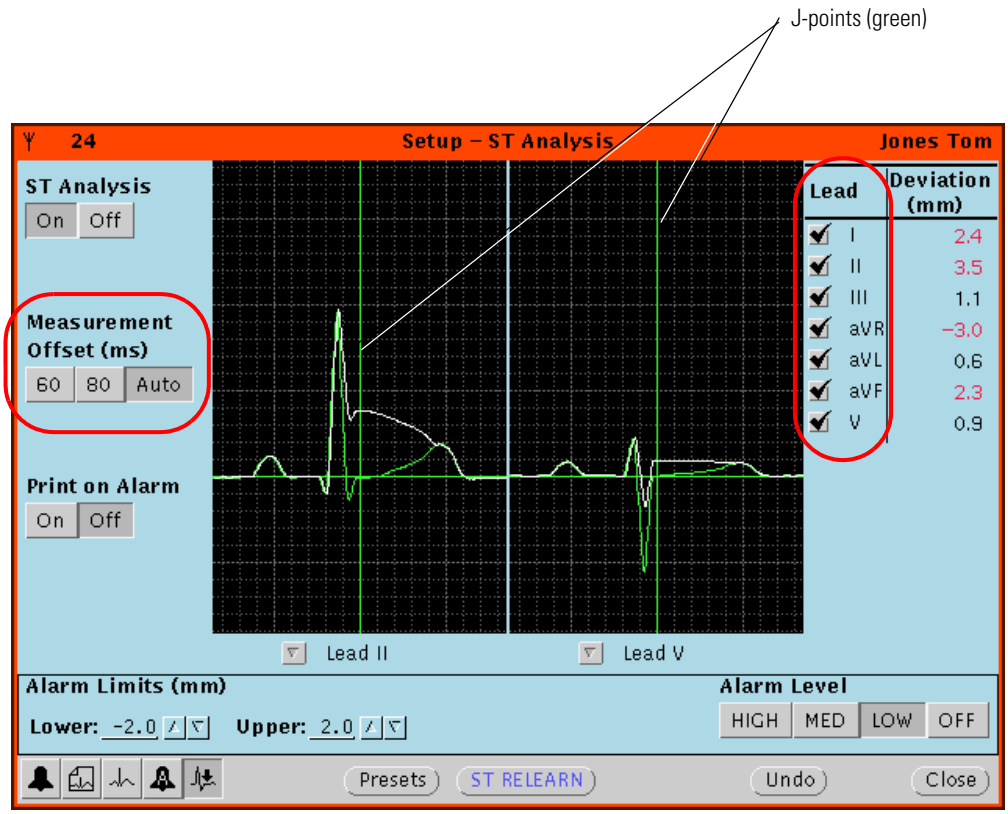
   Graphical trend values are shown in the Graphical Trends Review window. For instructions on how to view ST trends, see "Review graphical trends" on page 97).

Set analysis preferences for a patient's ST analysis

To set analysis preferences for ST analysis

1. In the patient's Virtual Monitor, click **Setup**, **ST Analysis**.

   The ST Analysis Setup window appears.



2. Leads: In the Lead column, check leads to be used for ST Analysis.

   Depending on the patient monitor, some of these choices cannot be deselected.

3. Measurement Offset: Click to set the offset from the J-point. This is the point at which the ST measurement is made.

   If you click Auto, the Acuity System selects the offset based on the patient's heart rate.

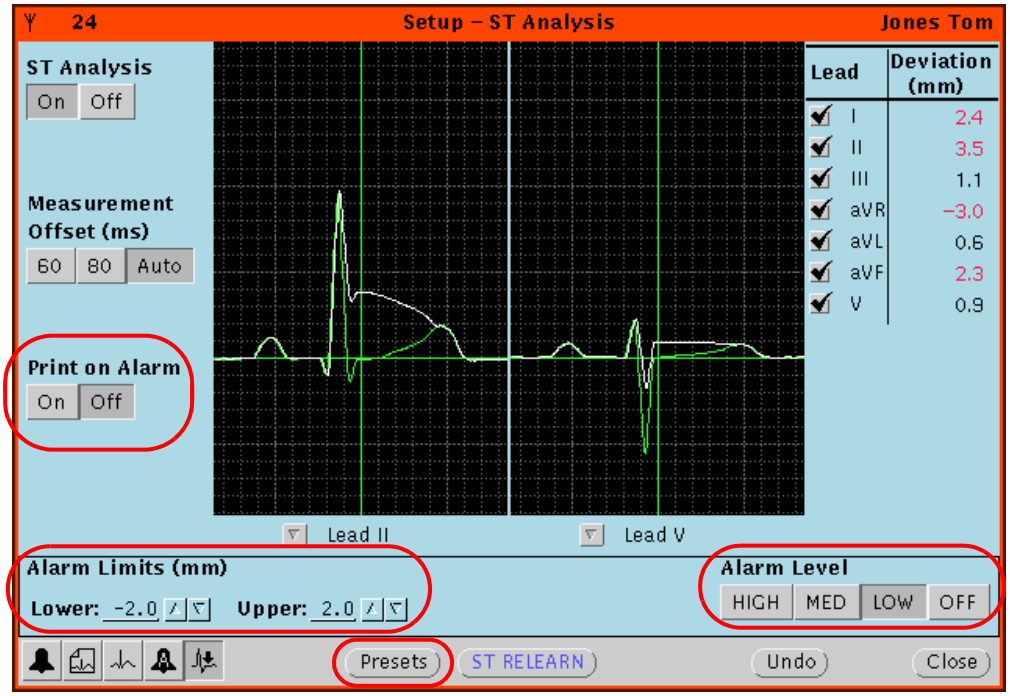
Set alarm preferences for ST Analysis

WARNING Turning off alarming for arrhythmia types and ST Analysis disables both audio and visual alarm indicators. Although alarming for lethal arrhythmias cannot be turned off, patients susceptible to arrhythmias must be kept under close physical surveillance if their alarming has been turned off for any arrhythmia types.

To set ST analysis alarm preferences

1. In the patient's Virtual Monitor, click **Setup**, **ST Analysis**.

   The ST Analysis Setup window appears.



2. Set alarm limits in one of these ways:

   - In the Alarm Limits area, click the arrows to set the lower and upper limits for deviation from the reference beat.
   - Click **Presets** to select preset ST Analysis settings.

     Clicking Presets resets alarm limits, alarm level, measurement offset and Print on Alarm. (For ST Analysis Presets values, see Table 36 on page 189.)

3. Set alarming indications.

   - Print on Alarm: Click **On** or **Off** to specify whether central station alarm printouts occur for ST Analysis alarms.
   - Alarm Level: Click to set the alarming level priority for ST alarms.

     For a description of alarm levels, see Table 6 on page 94.

     If you set Alarm Level to OFF, the system continues ST Analysis for checked leads, but it generates no ST alarms.

Initiate a relearn of a patient's reference beats for ST analysis

Description of the Relearn function

Arrhythmia and ST relearn is an Arrhythmia Analysis function that causes the Acuity system to relearn a patient's normal ECG rhythm. The Acuity System uses the relearned rhythm as a guideline to identify arrhythmia events (arrhythmia relearn) and to analyze deviation of the ECG ST-segment offset (ST relearn).

If you want to establish a new ST reference beat without changing the normal ECG rhythm used for arrhythmia analysis, initiate relearn in the ST Analysis Setup window.

When ST relearn occurs for a patient

- Only ST reference beat learning occurs when ST RELEARN is clicked in the ST Analysis Setup window.
- ST relearn also occurs along with Arrhythmia relearn when certain buttons are clicked in the Arrhythmia Alarms Setup window. For details, see "Initiate relearn of a patient's ECG rhythm" on page 63.

What occurs in a patient's windows during and after ST RELEARN is clicked

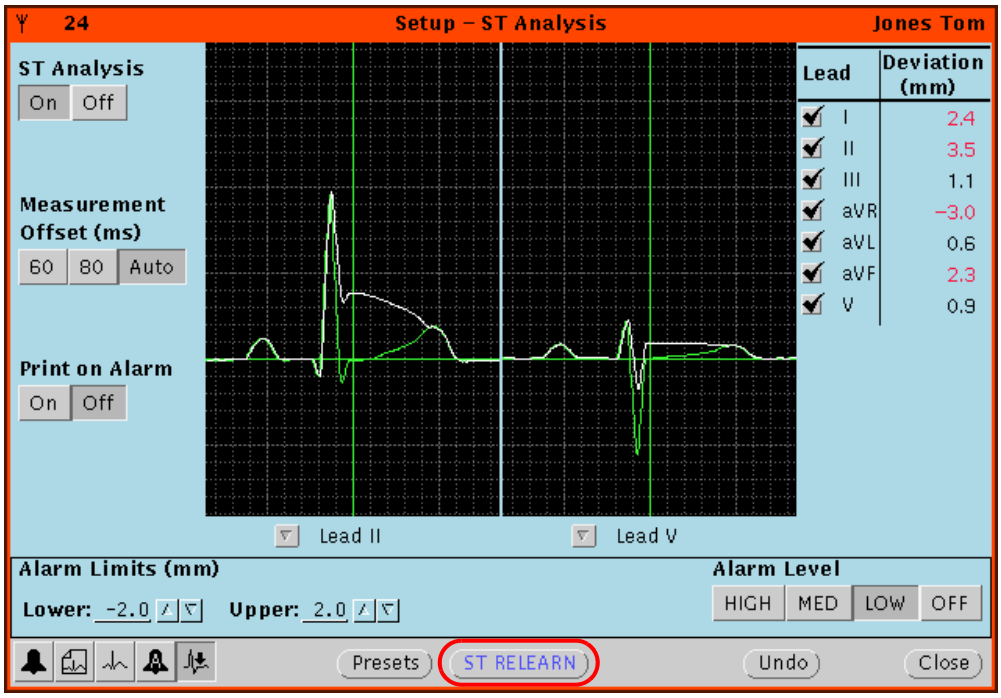
- ST Analysis Setup window: The waveform slice displays NO VALID BEATS, and the Acuity System can take up to 30 seconds to update the waveform.
- Most review windows and some printouts: Relearn and Learning Done event markers (▼) appear.

To initiate a relearn of a patient's reference beats for ST-segment analysis

The relearn operation cannot be undone.

1. In the patient's Virtual Monitor, click **Setup**, **ST Analysis**.

   The ST Analysis Setup window appears.



2. Carefully evaluate the patient's current ST segment for all active leads to ensure that you want the Acuity System to establish the beat as the patient's reference beat for ST Analysis.

3. Click **ST RELEARN**.

   The waveform area displays NO VALID BEATS for up to 30 seconds.

   The current beat for each ECG lead becomes the reference beat, and the deviation value for each current beat becomes zero.

4. Closely examine the current ST segment for all active leads to ensure that the Acuity System has defined an appropriate ST analysis reference beat.

Important considerations: ST Analysis

WARNING Before you set customized alarm limits for a patient, confirm the patient's ID and room number. Otherwise, customized limits might be lost.

WARNING Do not use the Arrhythmia Analysis or ST Analysis feature on neonates. The Arrhythmia Analysis and ST Analysis options are not intended for use with neonatal patients.

WARNING The ST algorithm has been tested for accuracy of segment data. As with all computerized ST analysis systems, the Acuity System cannot replace skilled care and proper surveillance by a clinician. A clinician must review all data obtained from the Acuity System, including the significance of ST-segment changes, before implementing therapy based on this data.

WARNING Ensure these things to minimize false HR, Arrhythmia Analysis and ST Analysis alarms, and to achieve optimal event detection and analysis:

- ECG cable, lead wires and electrodes are undamaged.
- Patient's skin is properly prepared.
- Electrodes are placed using standard good practices.
- 5-wire ECG cable is used. A 3-wire cable limits arrhythmia and ST-segment analyses to a single lead, and ST analysis is disabled when a lead failure occurs.
- LL electrode is connected. Otherwise, only one ECG lead is available and arrhythmia and ST-segment analyses are effected.
- Patient monitor and Virtual Monitor display these things:

  -HR numeric and ECG waveform

  -Non-noisy signal. If signal is noisy, reduce patient movement and increase distance from other electrical devices.

  -Correct patient mode for the patient
- Virtual Monitor ECG 1 and ECG 2 display these things:

  -ECG waveform

  - Waveform amplitude at least 160 µV, peak-to-peak

  -QRS complex amplitude at least twice the P or T wave amplitude

WARNING In Acuity Systems that include an Arrhythmia option, a relearn function causes the system to learn a patient's normal ECG rhythm. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as a normal. Thereafter, rhythms of this type might not trigger an alarm.

A relearn event can be initiated by a user or by the system. System relearns are in response to these circumstances:

- Patient connection
- Lead change or failure
- System restart

During an arrhythmia relearn event, the system posts a RELEARN alert in the patient's Virtual Monitor and Waveform Window. Carefully observe a patient during an Acuity System learning period. During learning, the system detects only VFib and asystole arrhythmias.

After a relearn event, "Relearn" and "Learning Done" event markers (▼) appear in most of the patient's review windows and some printouts. After relearn, carefully evaluate the new ECG rhythm and the current ST segment for all active leads to ensure that the system learned an appropriate rhythm. For evaluation instructions, see "To respond to a RELEARN alert" on page 91.

WARNING Minimize patient movement during a RELEARN, as movement creates noise during the reading. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm. Ensure that the patient remains still for 5 minutes after the RELEARN before allowing them to move.

Edit patient information

You can revise information within the Acuity System as follows:

- Edit a patient name
- Edit clinical information
- Edit a patient ID (Add an amended patient ID)
- Add a note to a patient's Waveform Window

If you want to change a patient's room number, see "Arrange a patient move from the patient monitor" on page 127.

Edit any patient information *except* a patient ID

Sometimes it is necessary to change or correct patient information. You might wish to correct the spelling of the name or change clinical information.

If you are monitoring a patient with a Propaq LT monitor, you can edit this information at the monitor instead, if you like.

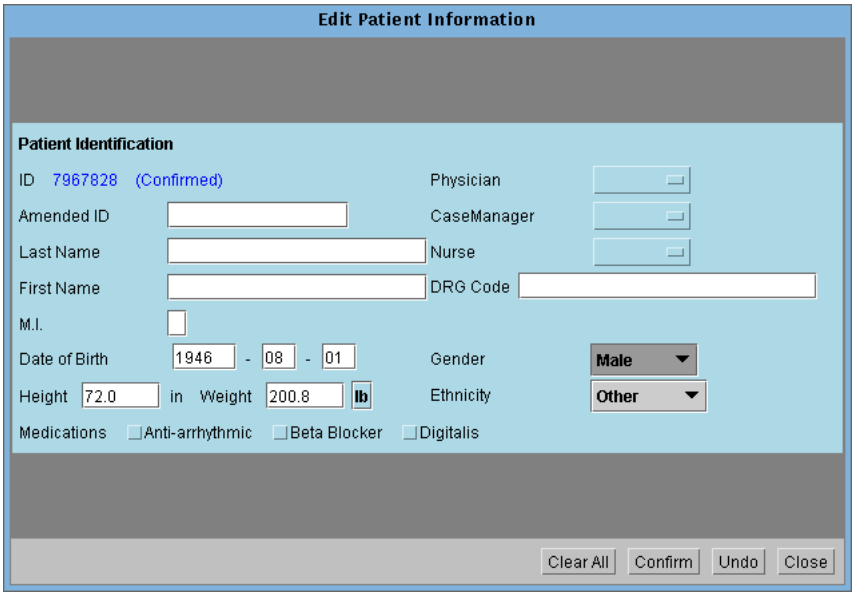
To edit any patient information *except* a patient ID

1. At the Acuity Central Station, click .

   The Patient List window appears.

2. Click the patient's name to highlight it, and then click **Edit**.

   The Edit Patient Information window appears.



3. Position the cursor after the information that you want to change, and press the Backspace key until the incorrect information is gone. Type the new information.

4. Click **Confirm**.

   The information is stored.

Edit a patient ID number: add an amended (revised) patient ID

Once a patient ID number is confirmed, it cannot be changed. However, if your Acuity System includes the amended ID feature, you can revise an original patient ID number by adding an amended ID. If necessary, you can change this amended ID again later.

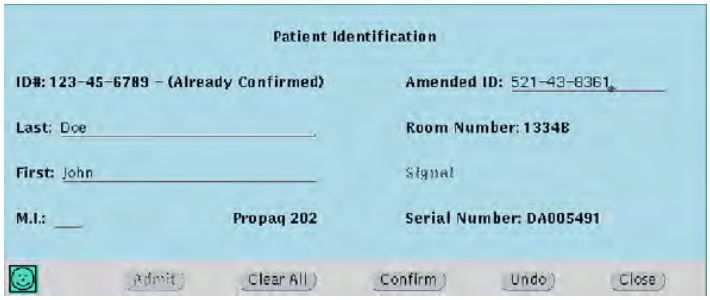
If you're monitoring a patient with a Propaq LT monitor, you can edit this information at the monitor instead.

Both IDs appear on printouts.

To add an amended (revised) patient ID

1. In a patient's Virtual Monitor, click **Setup**, **Patient ID**.

   The Patient ID Setup window appears.



2. Type or scan the number on the Amended ID line.
3. *Carefully review your entries for accuracy.*
4. Click **Confirm**.

   The information is stored.

Add or remove a note in a patient's Waveform Window

If you would like to attach a note or reminder to a patient's Waveform Window, such as when the patient temporarily moves to another location, you can enter the information in the Patient ID Setup window

The note remains in the Waveform Window until you remove it, even during wireless dropout.

Always remove a patient note when it is no longer relevant, to ensure that proper patient care is delivered.

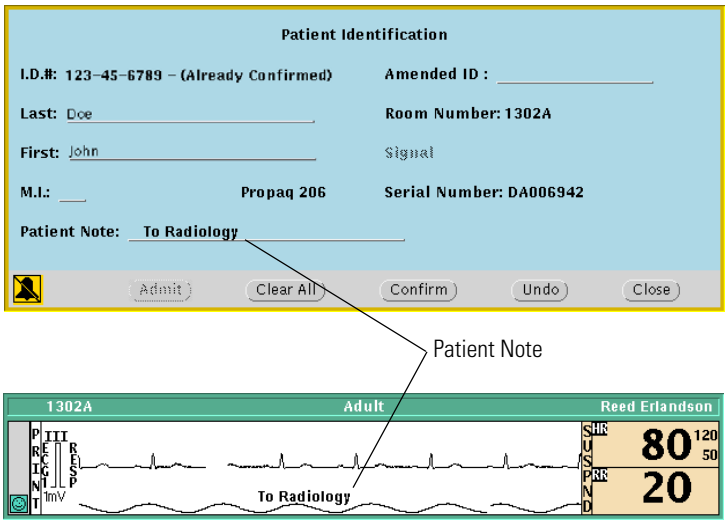
To add or remove a note in a patient's Waveform Window

1. Click the patient's map icon or Waveform Window icon.

   The patient's Virtual Monitor appears.

2. Click **Setup**, **Patient ID.**

   The Patient ID Setup window appears.



3. Add or remove a note.

   - To add a note, scan or type up to 20 characters on the Patient Note line.

     Carefully check your note.

   - To remove a note, use the Backspace key on your keyboard.

4. Click **Confirm**.

   The information is stored.

5. Click **Close**.

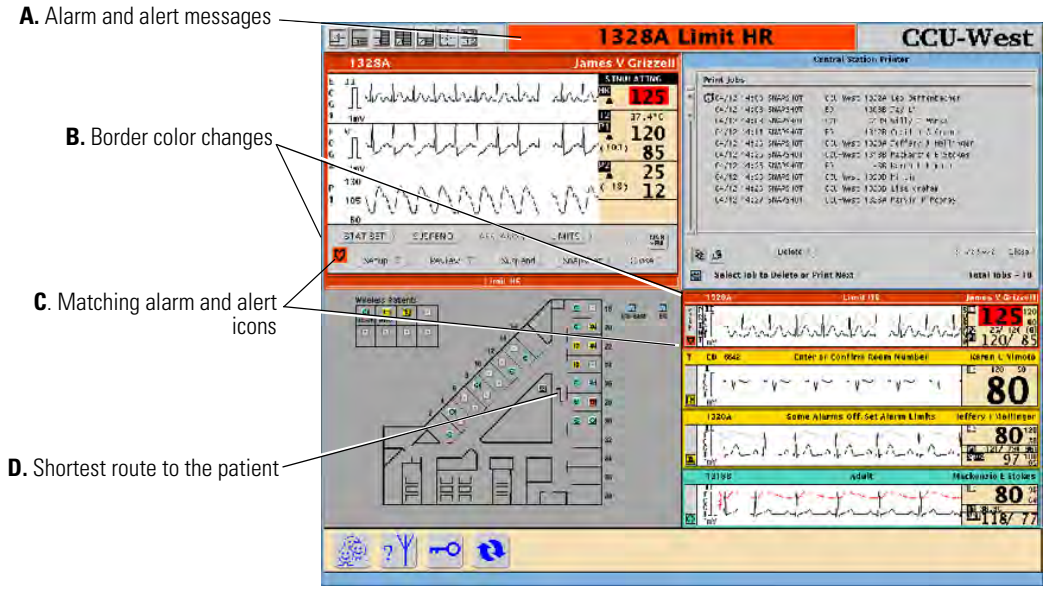
5 Respond to alarms and alerts

Overview of central station alarm and alert indications

- Alarms indicate patient vital-sign violations by showing red window borders, icons and vital-sign highlights. All alarms are associated with audible tones.
- Alerts indicate equipment problems or low-level patient information alerts by showing yellow window borders and icons. Some alerts are associated with audible tones.

  When conditions are corrected, the green, "patient monitoring OK" state is restored.

Figure 1. Acuity Central Station screen showing a patient in alarm



A. Alarm and alert messages	Alarm and alert messages are displayed in the message window.
B. Border color changes	Borders of Virtual Monitors and Waveform Windows in alarm change color and display specific messages.
C. Matching alarm and alert icons	Matching alarm or alert icons appear.
D. Shortest route to the patient	Shortest route from the Acuity Central Station to the patient's bedside.

Suspend an audible alarm or alert tone for 90 seconds

All patient alarms and some alerts are associated with tones (for details, see Table 6 on page 94).

You can silence tones temporarily from these places:

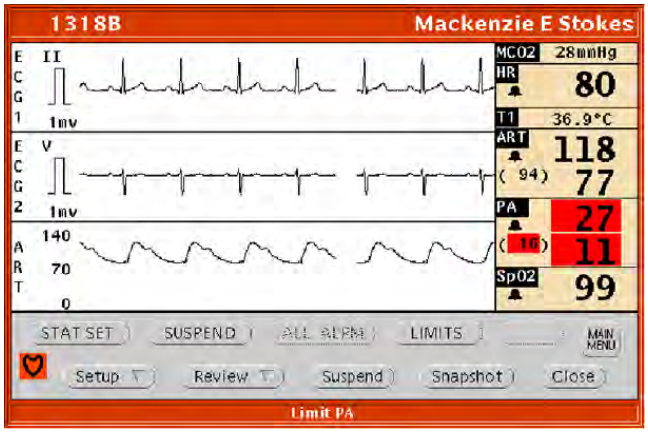
- Acuity Central Station
- Patient monitor
- (Optional) Mobile device running AcuityLink Clinician Notifier software

To suspend an audible alarm or alert tone from a Waveform Window

1. Bring your pointer into the Waveform Window.
2. Click in the numerics area to the right of the word SUSPND.

   Tones are suspended for 90 seconds.

To suspend an audible alarm or alert tone from a Virtual Monitor



1. Bring your pointer into the Virtual Monitor.
2. Click **Suspend**.

   Tones are suspended for 90 seconds.

Important considerations: suspending an audible alarm or alert tone

Related to indications

WARNING During an alarm or alert suspension period, be aware of new visual alarm indications that might occur on the patient monitor or Virtual Monitor. During a suspension period, these things occur at the Virtual Monitor and patient monitor:

- Audible tones are suspended for 90 seconds unless RESUME is clicked at the central station or the alarm tone is reset at the patient monitor.
- Alarms for life threatening events—apnea, asystole, ventricular tachycardia, and ventricular fibrillation—override the suspend state.
- All other new alarms for the same patient are indicated only visually, by additional red numeric highlights and arrhythmia or ST status messages.
- New equipment alerts are indicated only after the first alarm and alert conditions are corrected.

WARNING If an Acuity Central Station display is intentionally or inadvertently muted, alarm and alert tones do not occur at the display. If your central station display includes audible tones, remain aware of whether they are occurring. If they appear to have stopped, ensure that tones are restored.

Related to heart rate (HR) and arrhythmia alarms

WARNING All heart rate alarms are valid, even if the HR value at the central station differs from that at the monitor.

If your system includes an Arrhythmia Analysis option, the Acuity System heart rates for adult and pediatric patients are a result of system software analysis.

The HR/PR numeric changes to "---" in the Virtual Monitor, Waveform Window, review windows, and system printouts when the system detects ventricular fibrillation or asystole. However, an apparently valid heart rate numeric might show in the patient monitor.

Related to NIBP alarms

WARNING Always identify the source of an alarm before you suspend or silence it. When an NIBP alarm is suspended, the window borders and icon colors at the central station are the pre-alarm color instead of the typical red "Alarm Suspended" status.

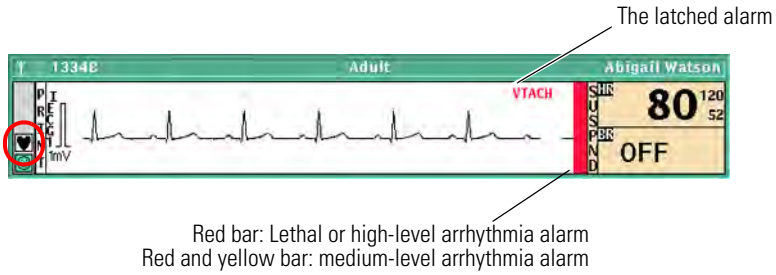
WARNING If a noninvasive blood pressure reading is suspect, repeat the measurement, watching a manometer (if the monitor has one) to verify the reading. If you are still uncertain about the reading, use another method.

Remove a latched arrhythmia alarm

If your Acuity System is configured to allow latched alarms, indications for certain arrhythmia alarms remain (or latch) in the Waveform Window, even after the alarm condition has ceased.

- Depending on configuration, lethal, high-level and possibly medium-level arrhythmia alarms visually latch in Waveform Windows. (For details about arrhythmia alarm levels, see "To adjust preferences for a patient's arrhythmia alarming" on page 61.)
- After the alarm condition becomes inactive, latching indications remain until you clear the latched alarm or until the alarm is replaced by another latched alarm of equal or higher priority.
- If you attempt to remove a latch for an alarm condition that is still active, the visual latch remains.

To remove a latched arrhythmia alarm



Take one of these steps:

- Click the colored bar to remove the latching indication(s).
- Click to remove the latching indication(s) and review the event.

  The Arrhythmia Events Review window appears.

The cursor clears the text and bar as it sweeps across the window.

Respond to specific alarms and alerts

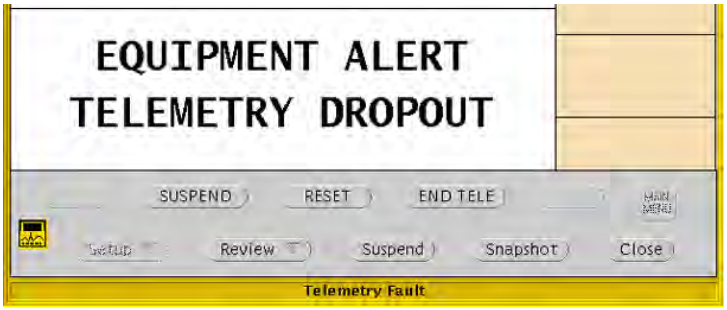
This section describes a few of the Acuity System alarms and alerts and how to respond to them.

Respond to a DROPOUT alert

When there is a loss of bi-directional communication between a wireless monitor and the Acuity System, an audible DROPOUT equipment alert occurs at the monitor and at the Acuity Central Station.

The monitor continues to provide local alarms and alerts, but alarms generated by the Acuity System, such as arrhythmia or ST analysis alarms, are not indicated, and you cannot access any Acuity System windows related to the patient.

To respond to a DROPOUT alert



Take one of these steps:

- Click **SUSPEND.**

  The audible tone is suspended for 90 seconds,.

- Click **RESET**.

  Alert indications stop and the Virtual Monitor is in the blue, “patient intentionally disconnected” state.

If the monitor resumes communication with the Acuity System, the Virtual Monitor, Waveform Window and patient icon return to the green, “patient monitoring OK” state.

Dismiss a CHECK PATIENT HR/PR alert

A patient monitor uses a single lead to calculate heart rate, and an Acuity System with an Arrhythmia Analysis option uses more sophisticated arrhythmia analysis algorithms.

Thus the patient monitor and Acuity Central Station heart rate readings for the same patient can differ. Differences mostly occur in response to these conditions:

- Rare ECG morphologies, such as "tall 'T' waves"
- Certain paced rhythms
- Noise or artifact

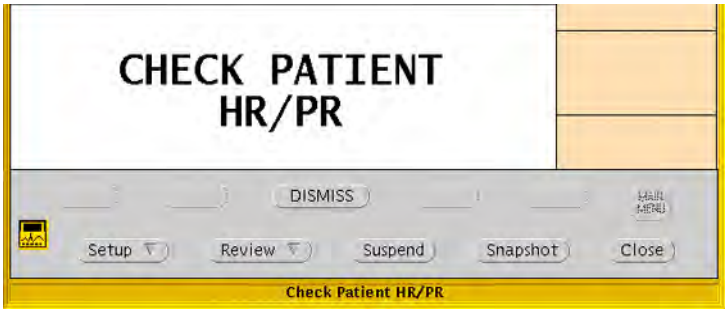
If the patient monitor displays a higher heart rate, it can present a heart rate alarm that the Acuity Central Station does not present.

If this condition occurs for a defined period, the patient's Acuity System Virtual Monitor might display a silent equipment alert (as defined by your system administrator) to inform you of the monitor alarm.

If the heart rate alarm stops at the patient monitor, the Acuity System dismisses this message.

Note You can attempt to reduce erroneous or nuisance heart rate alarms if the patient monitor is a Propaq LT, CS or Encore. For instructions, see Table 14 on page 152.

To dismiss a CHECK PATIENT HR/PR alert



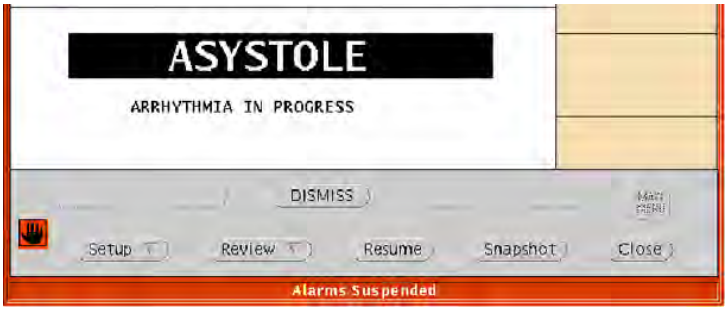
- Click **DISMISS**.

  The patient's Virtual Monitor and Waveform Window return to the green, "patient monitoring OK" state.

Dismiss an arrhythmia or ST alarm message

When you suspend an arrhythmia or ST alarm, the audible alarm tone is suspended for 90 seconds as usual. However, the Acuity System Virtual Monitor displays a visual message to call attention to the alarm.

To dismiss an arrhythmia or ST alarm message



- Click **DISMISS**.

  The border remains red, but the message is dismissed and you can see the waveforms.

Respond to a RELEARN alert

WARNING In Acuity Systems that include an Arrhythmia option, a relearn function causes the system to relearn a patient's normal ECG rhythm. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm.

A relearn event can be initiated by a user or by the system. System relearns are in response to these circumstances:

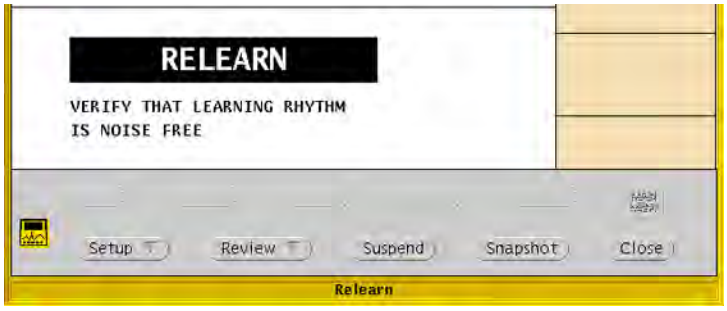
- Patient connection
- Lead change or failure
- System restart

During an arrhythmia relearn event, the system posts a RELEARN alert in the patient's Virtual Monitor and Waveform Window. Carefully observe a patient during an Acuity System learning period. During learning, the system detects only VFib and asystole arrhythmias.

After a relearn event, "Relearn" and "Learning Done" event markers (▼) appear in most of the patient's review windows and some printouts. After relearn, carefully evaluate the new ECG rhythm and the current ST segment for all active leads to ensure that the system learned an appropriate rhythm.

WARNING Minimize patient movement during a RELEARN, as movement creates noise during the reading. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm. Ensure that the patient remains still for 5 minutes after the RELEARN before allowing them to move.

To respond to a RELEARN alert



1. In the patient's Virtual Monitor, carefully evaluate the new ECG rhythm to ensure that the Acuity System has learned an appropriate rhythm.
2. Check the relearned ECG rhythm in the Waveforms Review window:
   a. Click **Review**, **Waveforms**.

      The Waveforms Review window appears.

   b. Click the Arrhythmia Relearn event marker (▼) shown at the time of the Relearn event.

   c. Examine the rhythm that the system learned to ensure that it appropriate.
3. If your Acuity System includes the ST Analysis option, examine the ST segment:
   a. Click **Setup**, **ST Analysis**.

      The ST Analysis Setup window appears.

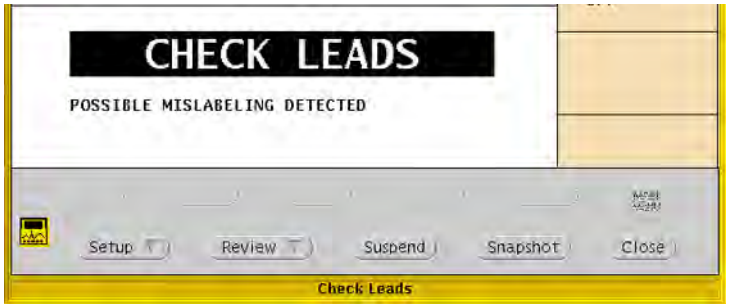
   b. Examine the current ST segment for all active leads to ensure that the Acuity System defined an appropriate ST analysis reference beat.
4. If the new ECG rhythm or ST segment is not appropriate, wait until the patient's ECG rhythm is suitable to be learned as a normal ECG rhythm, and then initiate a relearn.

   For instructions, see "To initiate relearn of a patient's ECG rhythm for arrhythmia and ST-segment analyses" on page 65.

Respond to a CHECK LEADS alert

The visual CHECK LEADS alert appears when the number of PVCs exceeds the normal ranges of PVC activity. The alert remains for a brief period.

To respond to a CHECK LEADS alert



1. Verify that the patient's lead wires and electrodes are in good condition.
2. Verify that the electrodes were placed using standard good practices.
3. Click **Review**, **Waveforms.**

   The Waveforms Review window appears.
4. Review the patient's waveforms for accurate beat labeling.

   A normal beat is indicated by a dot.
5. If it is necessary to initiate Relearn to establish the patient's normal ECG rhythm, see "To initiate relearn of a patient's ECG rhythm for arrhythmia and ST-segment analyses" on page 65.

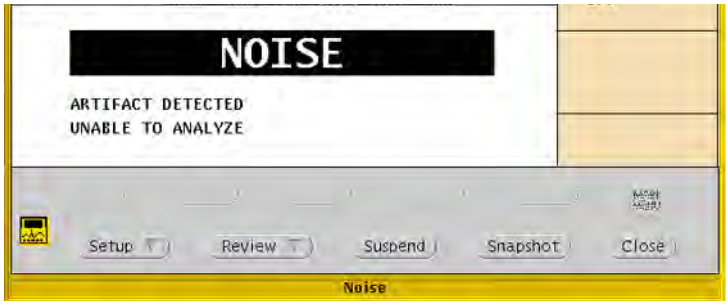
Respond to an arrhythmia NOISE alert

The visual NOISE alert occurs when the Acuity System can't analyze arrhythmia because of excessive electrical noise.

The Acuity System invalidates individual noisy leads and then re-validates them when noise is no longer detected.

At the Acuity Central Station, there is no heart rate reading during this alert, but the patient monitor might present a heart rate.

To respond to an arrhythmia NOISE alert



1. Verify that the patient's lead wires and electrodes are in good condition.
2. Verify that the electrodes were placed using standard good practices.

Summary of Acuity System alarm and alert levels

Alarm and alert levels determine which alarms or alerts are indicated if multiple alarms or alerts occur for a patient. This table shows a summary of alarm and alert levels. For a complete list of icons, see "Status icons" on page 135.

Table 6. Summary of alarm and alert levels at the Acuity System

Alarms (red)	Monitor equipment alerts (yellow)	System equipment alerts (yellow)	Patient information alerts (yellow)
Lethal arrhythmia alarms Ventricular fibrillation, asystole and ventricular tachycardia Lethal-level alarm tone: BEEP BEEP BEEP BEEP..... (Four loud beeps followed by a pause) **High-level alarms:** Arrhythmias with alarm levels set to high[a] ST-segment offset if alarm level set to high[b] Apnea alarms High-level alarm tone: BEEP BEEP BEEP..... (Three loud beeps followed by a pause) **Medium-level alarms:** Arrhythmias with alarm levels set to medium ST-segment offset if alarm level set to medium Patient vital-sign alarms Medium-level alarm tone: BEEP beep... (One loud and one softer beep, followed by a brief pause) **Low-level alarms:** No Continuous Heart/ Pulse Rate alarms Arrhythmias with alarm levels set to low ST Analysis with alarm level set to low Low-level alarm tone: beep...beep...beep..... (Three spaced, soft beeps, followed by a pause)	**Alerts:** Monitor Cannot Communicate Too Many Monitors Monitor Communication Lost Monitor Problem Alert Tone: beep..... beep (A soft beep followed by a long pause) Note: Some Monitor Problem alerts are not associated with audible tones.	**Low-level alerts:** Hallway Message Panel Problem Unrecognized Networked Acuity System Central Printer Problem Disk Problem Network Problem Connectivity Server Unavailable Some Connectivity Services Unavailable Devices Running Clinician Notifier are Not Reachable These alerts are not associated with audible tones.	**Low-level alerts:** Alarm(s) Off Unconfirmed Patient ID Unconfirmed Room Number These alerts are not associated with audible tones.

a. Arrhythmia alarm levels are set in the Arrhythmia Alarms Setup window. Arrhythmia alarms are further prioritized by list order in this window.

b. ST alarm levels are set in the ST Analysis Setup window.

6 Review or print patient data

Review patient data

If your Acuity System includes the Full Disclosure option, waveforms and trend information for all patients are stored for a configurable period, up to 96 hours.

Locate patient data

This section describes how to locate data for a patient in any unit within your Acuity System or networked Acuity System.

To locate a patient

1. In the lower left corner of the Acuity Central Station screen, click .

   The Patient List window appears.

2. Scroll the patient list.

   - If the patient is listed, proceed to Step 4.
   - If the patient is not listed, click **Other Patients** to view networked Acuity System units.

     The Other Patients Lists window appears.

3. List patients by one of these criteria:

   - Click **Unit**, and then select the unit name from the list in the box on the right (networked Acuity System).
   - Click **Last Name** or **First Name**, and then click the first letter of the name.

4. Click a column heading to sort the list by name, location or ID.

   Actively monitored patients are listed at the top.

5. Locate the patient name in the list.

To view the patient's data

1. In the Patient List window or Other Patients Lists window, click a patient's name in the list.
2. Click one of these buttons:
   - Click **Summary** to view a summary of the patient's monitoring history.

     Summary is not available in the Other Patient List screen.
   - Click to view the patient's Graphical Trends Review window.
   - Click to view the patient's Tabular Trends/Events Review window.
   - Click to view the patient's Waveforms Review window.
   - Click

to view the patient's OxyCRG Review window.
   - Click to view the patient's Arrhythmia Events Review window.
   - Click to view a current patient's Virtual Monitor.

   If the review icons for a patient are grayed out, the patient's review information is no longer stored by the Acuity System.

Review graphical trends

In the Graphical Trends Review window, you can review and print data in these ways:

- Scroll graphical trend data for up to five vital signs at once.
- Locate red alarm periods along the trend graphs.
- View event markers above the top graph.
- Click graphs to see numeric values and event identifiers.
- Jump to the next or previous alarm.

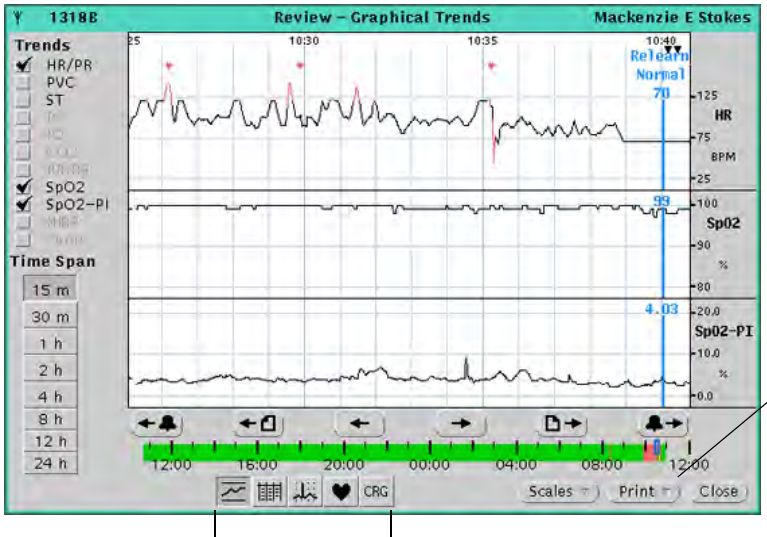
Open a Graphical Trends Review window

To open a Graphical Trends Review window

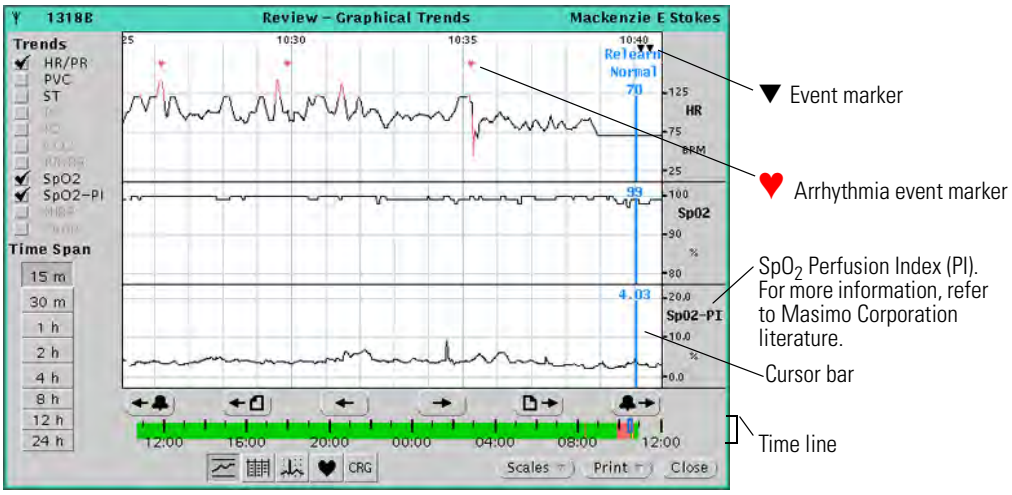
1. (Optional) In the upper left corner of the Acuity Central Station screen, click or to change the screen view to see a larger review window.
2. Open the window for one of these types of patients:

- Current patient in local unit:
  In the patient's Virtual Monitor, click **Review**, **Graphical Trends**.
- Non-monitored patient or patient in a networked Acuity System unit:
  a. In the Acuity Central Station screen's lower left corner, click .
  b. For a patient in the listed unit: Click the patient's name, and then click .
  For a patient in another unit: Click **Other Patients,** the patient's name, and .

The Graphical Trends Review window appears.



Adjust the graphical trends display and locate events



To adjust the time period shown in the graphs area of the window

1. Under Time Span, click a button.

   Time markers show along the top of the graphs area.

2. Click on the time line to display data from a different time period.

   Along the time line, patient alarms are red.

3. Click → or ← to scroll the display forward or backward.

   Click 🗋→ or ←🗋 to page the display forward or backward.

To select and adjust the trend graphs

1. Under Trends, check boxes to display associated trend graphs.
2. Click **Scales**, and then make a selection.

To locate and display alarm and event information

1. Click any of these things for details:

   - Click a red (alarm) area along a trend graph.
   - Along the top of the window, click an event marker.

     ▼ indicates Relearn, Learning Done or Snapshot Print events.

     ♥ indicates that an arrhythmia alarm was recorded.

     ♥ indicates that an arrhythmia event was detected, but no alarm occurred because alarming for this arrhythmia type was turned off in the Arrhythmia Alarms Setup window.

   The blue cursor bar identifies event types and shows numeric values along each trend graph.

2. Click 🔔→ or ←🔔 to jump to the next or previous alarm.

Review tabular trends and events

In the Tabular Trends and Events Review window, you can review and print trends in these ways:

- View vital-sign values and alarm events in a tabular format, at various intervals.
- Click events in the list to view (up to two) corresponding waveforms.
- (Arrhythmia option) View normal and ventricular ECG beat labels along the waves.
- In the waveforms, jump to the next or previous alarm.

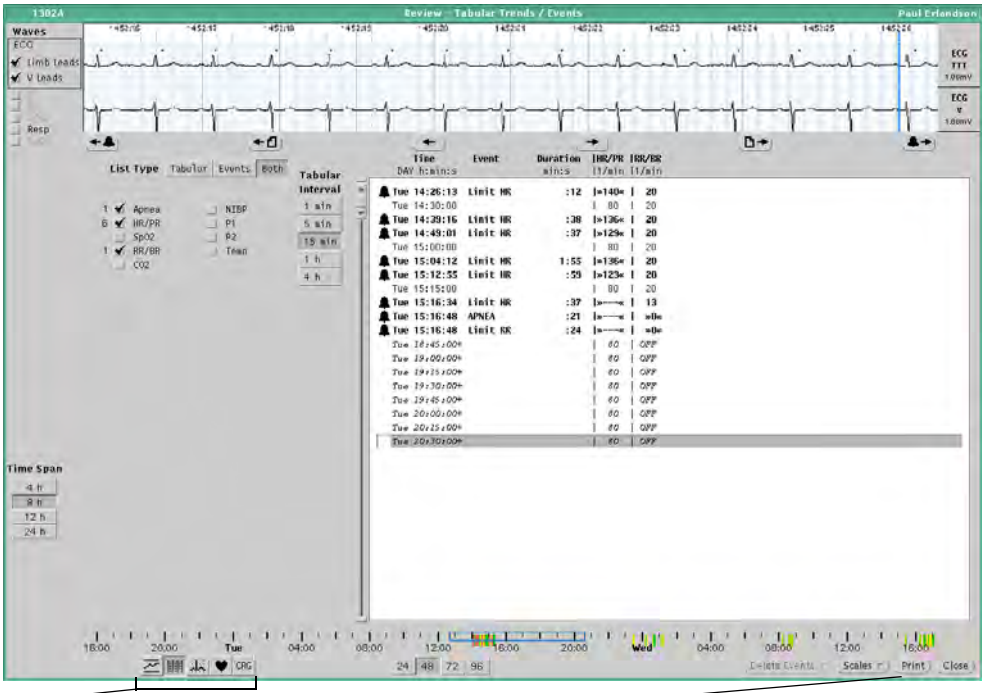
Open a Tabular Trends/Events window

To open a Tabular Trends/Events Review window

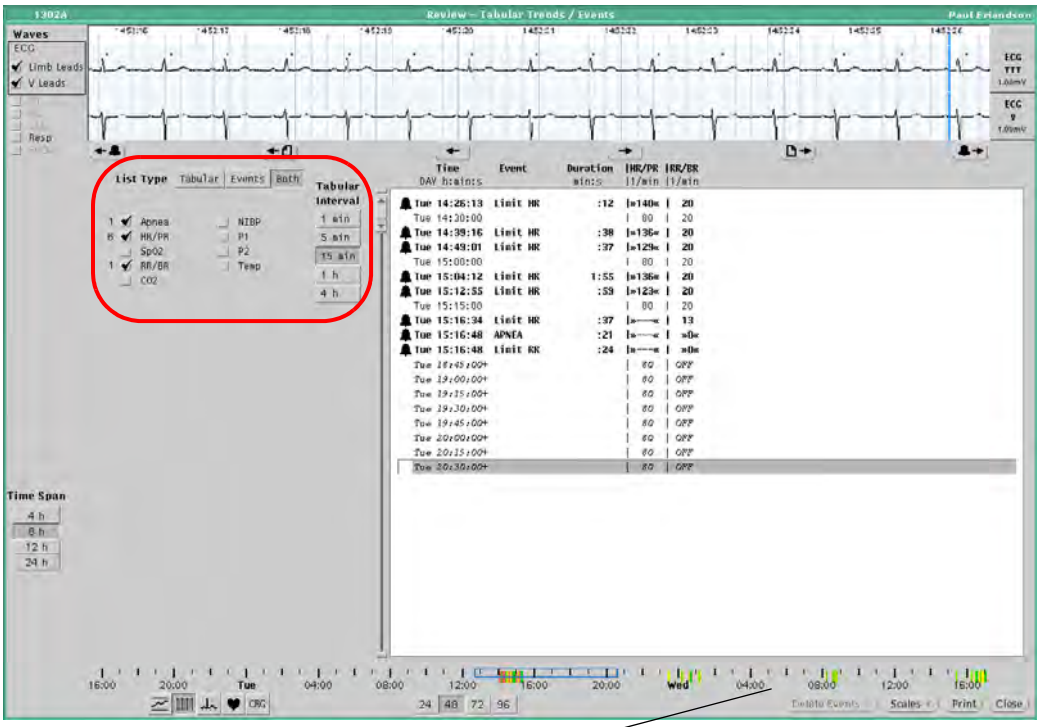
1. Open the window for one of these types of patients:

- Current patient in local unit:
  In the patient's Virtual Monitor, click **Review**, **Tabular Trends/Events**.
- Non-monitored patient or patient in a networked Acuity System unit:
  a. In the Acuity Central Station screen's lower left corner, click .
  b. For a patient in the listed unit, click the patient's name and .
  For a patient in another unit, click **Other Patients,** the patient's name and .

  The Tabular Trends/Events Review window appears.


Review - Tabular Trends / Events
Waves
List Type
Tabular Interval
Time Span
These open the Graphical Trends, Tabular Trends/Events, Waveforms, Arrhythmia Events and OxyCRG Review Windows.
Prints a Review Print that covers the time span shown in the window.

Adjust the content of the tabular list



To adjust the time period covered in the tabular list

1. Click a number under the time line to adjust the line's scope, in hours.
2. On the time line, click an area in which you are interested (events are red).

   The blue box moves. The box indicates the time span covered in the list.
3. Under Time Span, click to specify the number of hours spanned in the list.

   The listings change.

To specify the format of the tabular list

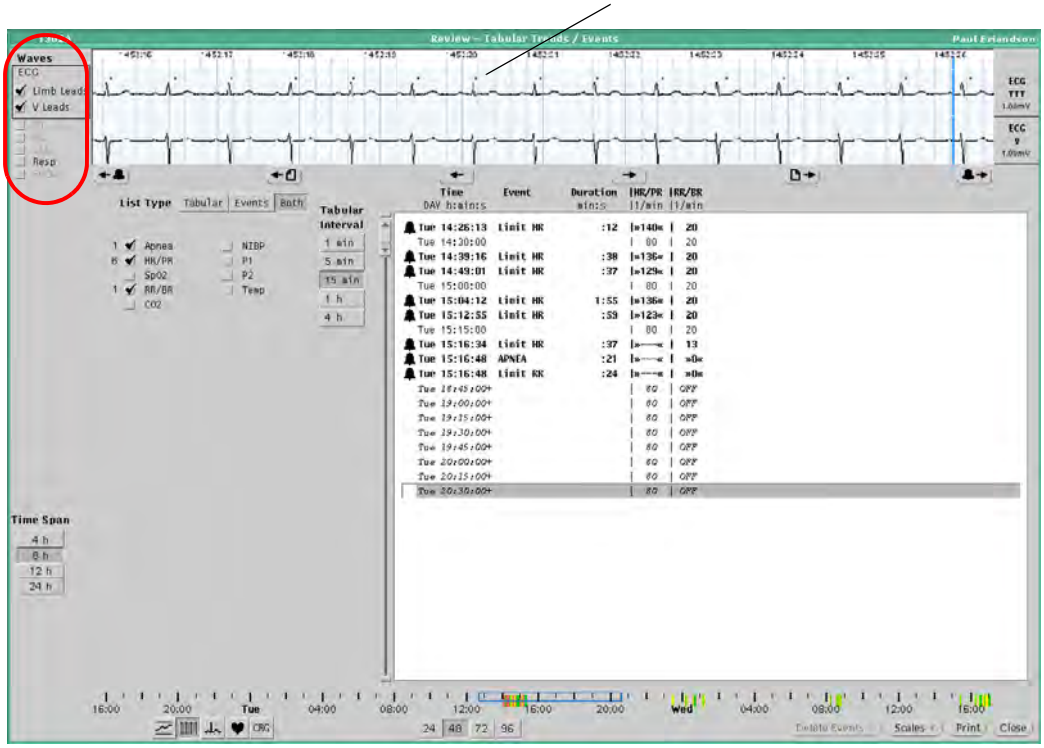
1. Next to List Type, click one of these buttons:

   - Click **Tabular** to list tabular data only.
   - Click **Events** to list events only.
   - Click **Both** to list tabular data and events.
2. Check vital-sign boxes to list corresponding data and events.

   The number of events that occurred in the time span appears beside each box.
3. Under Tabular Interval, click to specify the frequency interval at which data are listed.

   For example, *15 min* means that readings are listed four times during each hour (e.g. 12:00, 12:15, 12:45 and 1:00). However, all *events* in the time-span are listed, in bold.

Adjust the waveform display



To display waveform(s) that correspond to a trend or event in the tabular list

1. In the list, locate a trend or event in which you are interested.
2. Click the trend or event.

   The corresponding waveform(s) appear in the waveform pane.
3. Scroll the waveform.

   Click → or ← to scroll forward or backward.

   Click 🗋→ or ←🗋 to page forward or backward.
4. Click 🔔→ or ←🔔 to jump to the next or previous alarm.

   The associated event is highlighted in the list.

To select and adjust the waveform(s)

1. Check one or two boxes under Waves to view waveforms for corresponding vital signs or ECG lead sources.

   If you see only one waveform and you prefer two, click ⊞ in the upper left corner of the Acuity System screen to change to the full-screen view.
2. Click **Scales**, and then make a selection.

Review waveforms

(Full Disclosure option)

In the Waveforms Review window, you can review and print the waveforms in these ways:

- Scroll up to five vital-sign waveforms at once.
- (Arrhythmia option) View normal and ventricular ECG beat labels along the waves.
- Click graphs to identify event markers above the waveforms.
- Jump to the next or previous alarm or arrhythmia event (or next/previous alarm or event of the same type as the one currently shown).

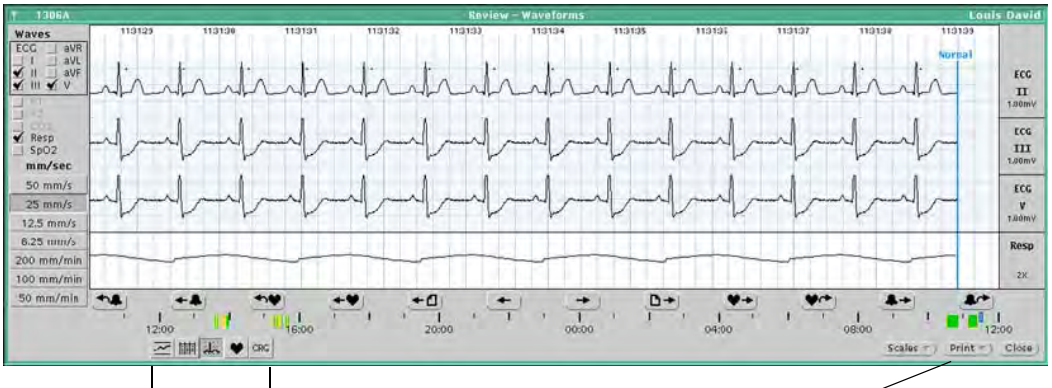
Open a Waveforms Review window

To open a Waveforms Review window

1. (Optional) In the upper left corner of the Acuity Central Station screen, click or to change the screen view to see a larger review window.
2. Open the window for one of these types of patients:

- Current patient in local unit:
  In the patient's Virtual Monitor, click **Review**, **Waveforms**.
- Non-monitored patient or patient in a networked Acuity System unit:
  a. In the Acuity Central Station screen's lower left corner, click .
  b. For a patient in the listed unit, click the patient's name and .
  For a patient in another unit: Click **Other Patients,** the patient's name, and .

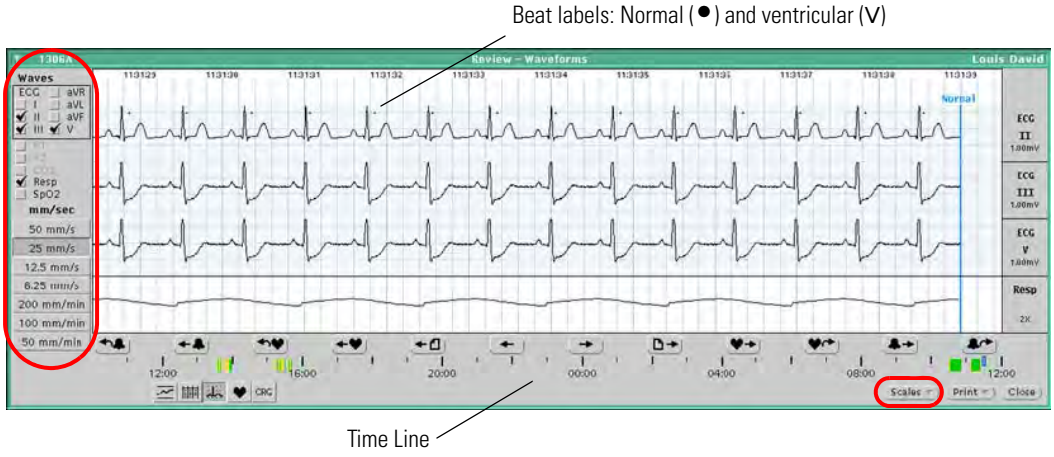
  The Waveforms Review window appears.



These open the Graphical Trends, Tabular Trends/Events, Waveforms, Arrhythmia Events and OxyCRG Review Windows.

Prints a Review Print that covers the time span shown in the window.

Display waveforms and events



To select and adjust waveforms

1. Check up to five boxes to display waveforms for corresponding vital-signs and ECG lead sources.

   If the patient monitor includes SpO_2 Signal IQ detection and you check SpO_2, SIQ occupies a waveform slot in the display.

2. Click **Scales,** and then make a selection.

3. Click under mm/sec to adjust sweep speeds.

To adjust the period shown in the window

1. Click on the time line to display waveforms from a different time period.

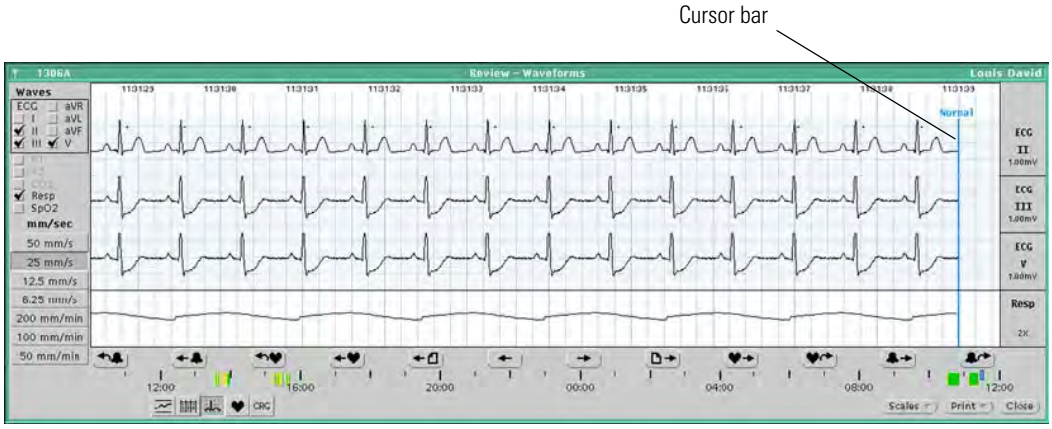
   Along the time line, patient alarms are red.

2. Scroll the waveforms.

   Click → or ← to scroll forward or backward.

   Click ⇥ or ⇤ to page forward or backward.

To locate and display alarm and event information



1. Along the top of the waveforms, click an event marker.
   - ▼ event markers show Relearn, Learning Done or Snapshot Print events.
   - ♥ event markers show that an arrhythmia alarm was recorded.
   - ♥ event markers show that an arrhythmia event was detected, but no alarm occurred because alarming for this arrhythmia type was turned off in the Arrhythmia Alarms Setup window.

   The blue cursor bar identifies event types along each waveform.
2. Jump to the next or previous alarm or arrhythmia event.
   - Click or to jump to the next or previous alarm.
   - Click or to jump to the next or previous arrhythmia event.
3. Jump to the next or previous event of the same type that is currently displayed.
   - Click or to jump to the next or previous alarm of the same type.
   - Click or to jump to the next or previous arrhythmia event of the same type.

   The blue cursor bar identifies the event.

   If you do not see some of these buttons in the window, click or in the upper left corner of the Acuity System screen to change the screen view.

Review arrhythmia events

(Arrhythmia Analysis option)

In the Arrhythmia Events Review window, you can review and print arrhythmia events in these ways:

- List arrhythmia events and event counts, by type.
- Review ECG waveforms associated with arrhythmia events.
- View normal and ventricular ECG beat labels.
- Jump to the next or previous alarm or arrhythmia event.
- Jump to the next or previous alarm or arrhythmia event of the same type as the one currently shown.
- (Advanced Arrhythmia Analysis option) Delete or undelete an arrhythmia event marker from review windows and printouts.

If your window appears abbreviated, your system includes the Lethal Arrhythmia Analysis option (lethal arrhythmia detection, only).

Open an Arrhythmia Events Review window

To open an Arrhythmia Events Review window

1. Open the window for one of these types of patients:

- Current patient in local unit:

In the patient's Waveform Window, click .

- Non-monitored patient or patient in a networked Acuity System unit:
  a. In the Acuity Central Station screen's lower left corner, click .
  b. For a patient in the listed unit, click the patient's name and .

  For a patient in another unit: Click **Other Patients,** the patient's name, and .

The Arrhythmia Events Review window appears.

These open the Graphical Trends, Tabular Trends/Events, Waveforms, Arrhythmia Events and OxyCRG Review Windows.

Prints a Review Print that covers the time span shown in the window.

Adjust the content of both list sections

Event counts section
Numbers of arrhythmia events that occurred in the selected time span are listed here.

Events list section
All events checked in the event counts section (left) are listed and described here.

To adjust the time period covered in both list sections

1. Click a number under the time line to adjust the line's scope, in hours.
2. On the time line, click an area in which you are interested. Events are red.

   The blue box moves. The box indicates the time span covered in both sections.
3. Under Time Span, click to specify the number of hours spanned in both list sections.

   In the event counts section, the number of events beside each box is updated to reflect the current time span.

   In the events list section, the listings change.

To specify the content of the events list

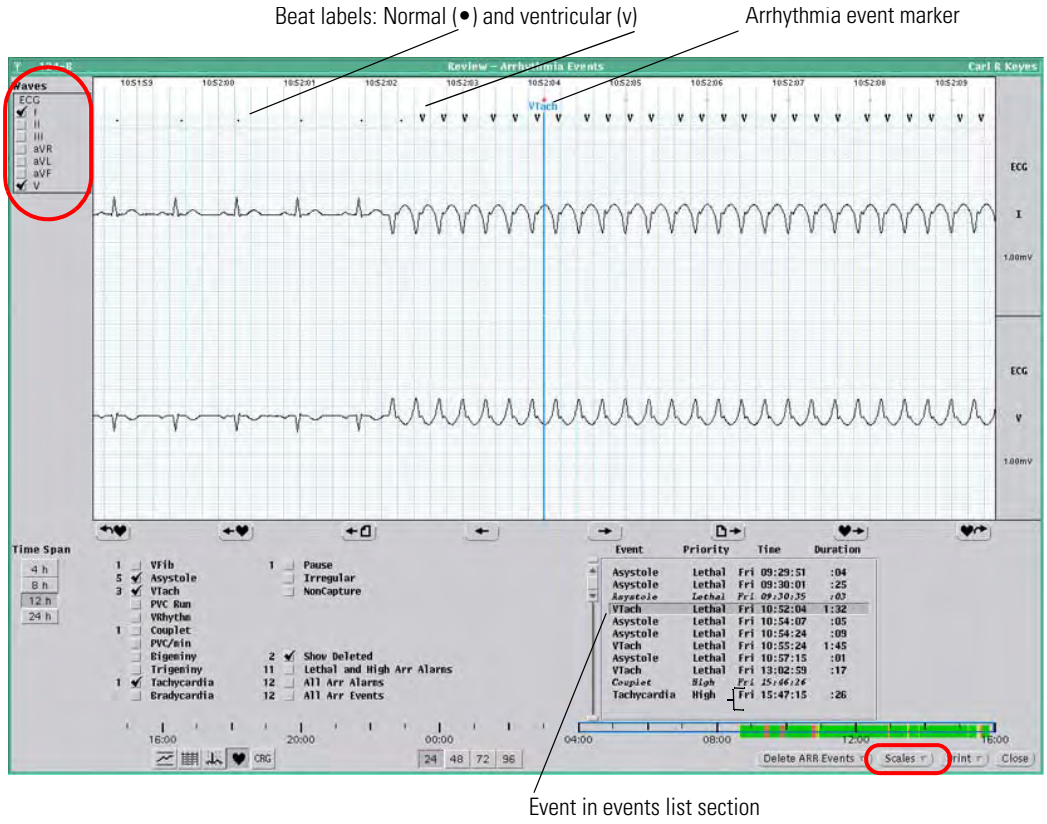
1. In the event counts section, check any of these things to list them in the events list section:

   a. Check arrhythmia-types.

   b. Check these boxes to further refine the listings:

   - Lethal and High Arr Alarms: List only lethal events and events that were set to high priority in the Arrhythmia Alarms Setup window.
   - All Arr Alarms: List all events that alarmed.
   - All Arr Events: List all events that occurred, whether or not they were set to alarm.

Adjust the waveform display



To display waveform(s) that correspond to an event

1. In the events list section, click an event.

   The corresponding waveform(s) appear in the waveform pane, and the blue cursor bar indicates the event.

2. Scroll the waveform.

   Click → or ← to scroll forward or backward.

   Click →| or |← to page forward or backward.

3. Click ♥→ or ←♥ to jump to the next or previous arrhythmia event.

   Click ♥↷ or ↶♥ to jump to the next or previous arrhythmia event of the same type that is currently indicated by the cursor bar.

To select and adjust the waveform(s)

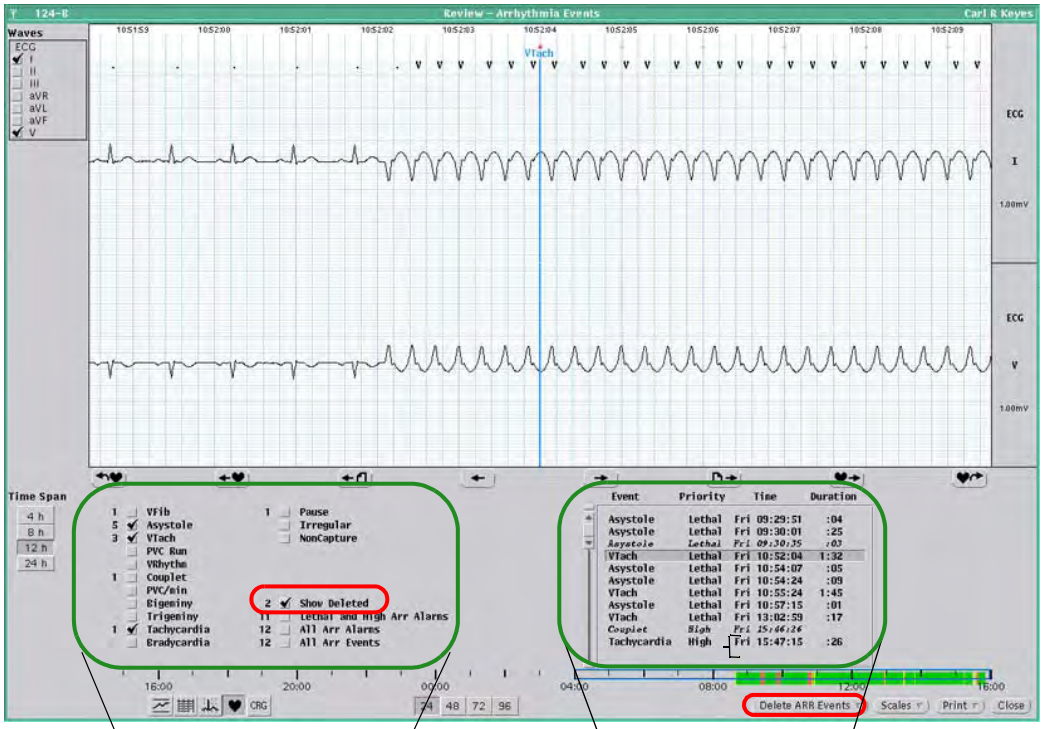
1. Check boxes under Waves to display waveforms from different ECG lead sources.

   Up to seven waveforms can fit in the window.

2. If you see less than seven waveforms, and you prefer more, click ▦ in the upper left corner of the Acuity System screen to change to the full-screen view.

3. Click **Scales,** and then make a selection.

Delete or undelete an arrhythmia event marker from review windows and printouts (Advanced Arrhythmia Analysis option)



Event counts section
Numbers of arrhythmia events that occurred in the selected time span are listed here.

Events list section
All events checked in the event counts section (left) are listed and described here.

To delete an event from review windows and printouts

1. In the event counts section, check boxes next to event-types that you would like to delete.
2. In the events list section, click the arrhythmia that you would like to delete.
3. Click **Delete ARR Events**, and then click **Delete Selected**.

   The event is deleted.

To undelete an event fro review windows and printouts

1. In the event counts section, check the **Show Deleted** box to show italicized (deleted) events in the events list section.

   The number of deleted events in the displayed time span appears to the left of the box
2. In the events list section, click the italicized event that you would like to undelete.
3. Click **Delete ARR Events**, and then click **Undelete Selected**.

   The event is restored.

Review ST analysis information

This section explains how to review ST analysis review information. In the ST Analysis Setup window, you can do these things:

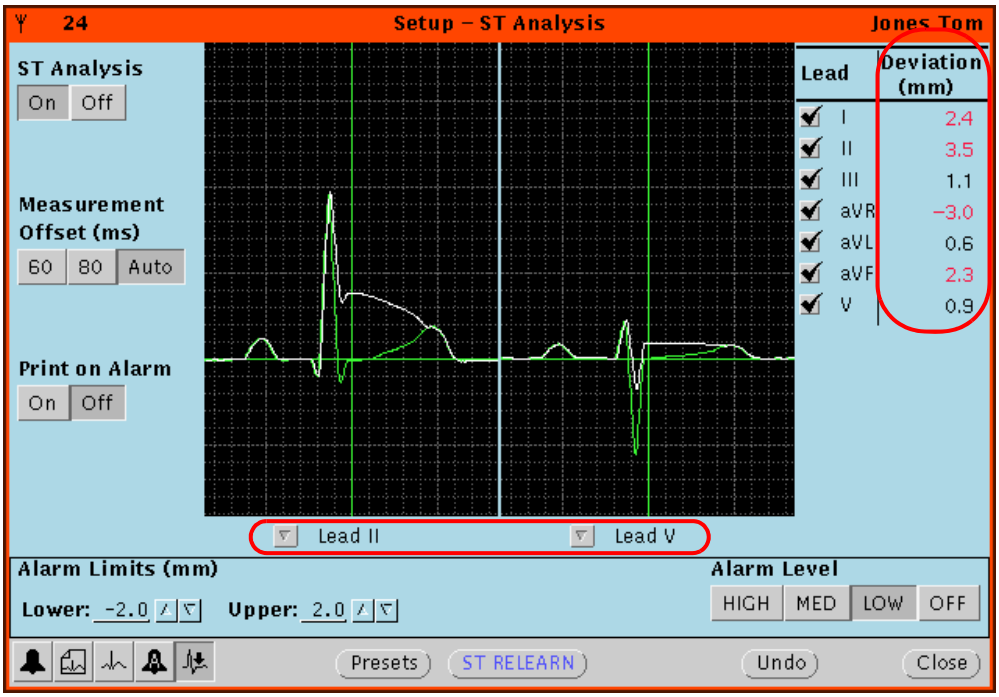
- View current beats for specific leads
- View current ST-segment deviation values, including alarm values

If you are would like information about setting up ST-segment analysis, see "ST Analysis option" on page 68.

To view current beats and ST-segment deviation values

1. In the patient's Virtual Monitor, click **Setup**, **ST Analysis**.

   The ST Analysis Setup window appears.



2. Beneath the waveforms, click the arrows to select the leads used for one or both lead displays.
3. View current ST-segment deviation values in the Deviation column.

   Alarm values are red.

   Graphical trend values are shown in the Graphical Trends Review window. For instructions on how to view ST trends, see "Review graphical trends" on page 97).

Review OxyCRG information

(Full Disclosure option)

In the OxyCRG review window, you can review and print oxygen cardiorespirogram information in these ways:

- Scroll respiration and CO_2 waveforms and graphical trend data for HR/PR and SpO_2.
- Locate red alarm periods along the trend graphs.
- Click graphs to see vital-sign values.
- Jump to the next or previous alarm.

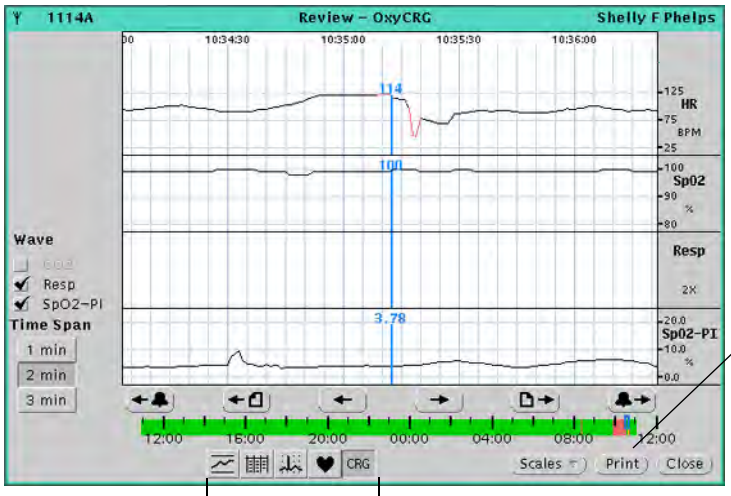
Open an OxyCRG Review window

To open an OxyCRG Review window

1. (Optional) In the upper left corner of the Acuity Central Station screen, click or to change the screen view to see a larger review window.
2. Open the window for one of these types of patients:

- Current patient in local unit:
  In the patient's Virtual Monitor, click **Review**, **OxyCRG**.
- Non-monitored patient or patient in a networked Acuity System unit:
  a. In the Acuity Central Station screen's lower left corner, click .
  b. For a patient in the listed unit: Click the patient's name, and then click CRG.
  For a patient in another unit: Click **Other Patients,** the patient's name, and CRG.

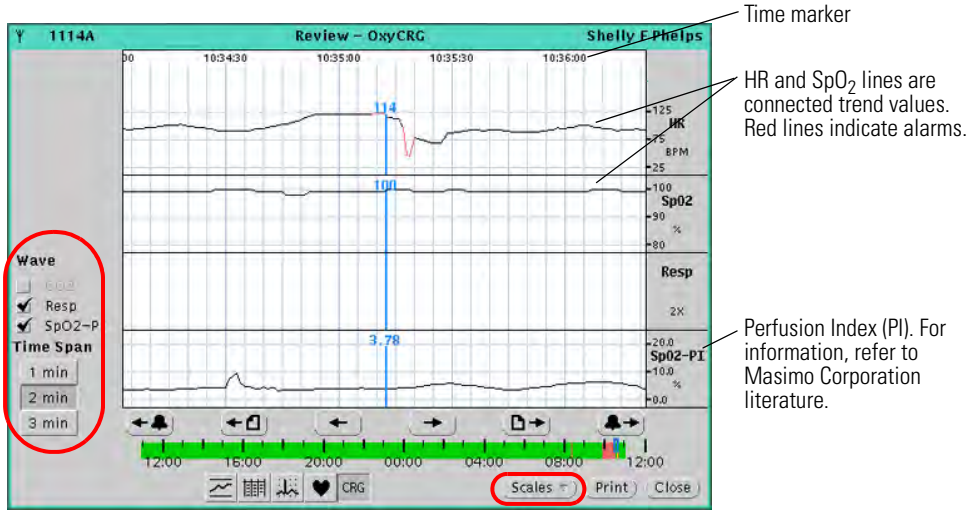
The OxyCRG Review window appears.



Prints a Review Print that covers the time span shown in the window.

These open the Graphical Trends, Tabular Trends/Events, Waveforms, Arrhythmia Events and OxyCRG Review Windows.

Adjust the OxyCRG display and locate alarms



To adjust the time period shown in the display area of the window

1. Under Time Span, click a button.

   Time markers show along the top of the graphs area.

2. Click on the time line to display data from a different time period.

   Along the time line, patient alarms are red.

3. Scroll the display.

   Click → or ← to scroll the display forward or backward.

   Click ⇥ or ⇤ to page the display forward or backward.

To select and adjust the CO_2 waveform and the trend graphs

1. Under Wave, check up to three boxes to display the corresponding wave or trend graphs.
2. Click **Scales**, and then make a selection.

To locate and display alarm information

1. Click a red (alarm) area along a trend graph or wave.

   The blue cursor bar shows vital-sign values along each trend graph or wave.

2. Click 🔔→ or ←🔔 to jump to the next or previous alarm.

Print and review printouts

The Acuity System includes five types of printouts:

- Snapshot printouts
- Review printouts
- Alarm printouts
- Patient List printouts
- 12-Lead printouts

Snapshot printouts

Snapshot printouts provide an instant snapshot of a currently monitored patient's data and waveforms.

Information in a Snapshot printout

- Data from fourteen seconds before and seven seconds after the Snapshot button is clicked
- The same waveforms that are selected for display in the Virtual Monitor

On demand and automatic central station Snapshot printouts

On demand Snapshot printouts are printed from these places:

- A Waveform Window or Virtual Monitor
- Some patient monitors

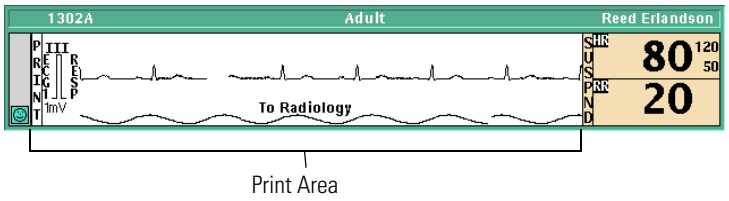
  For more information, see the directions for use of the monitors in question.

Automatic snapshot printouts:

- If you are interested in setting automatic intervals for snapshot printouts to occur, see "Adjust preferences for a patient's central station printouts" on page 49.

Print a Snapshot printout on demand

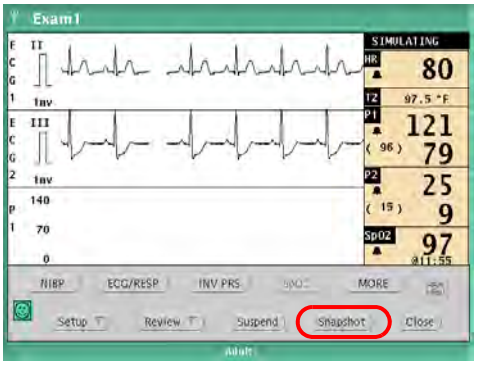
To print a snapshot from a Waveform Window



- Bring your pointer into the window and click **PRINT**, or click anywhere in the Waveform Area.

  A printout occurs at the Acuity System printer.

To print a snapshot from a Virtual Monitor



- Click **Snapshot**.

  A printout occurs at the Acuity System printer.

Review printouts

Review printouts capture information shown in a current or non-monitored patient's review window.

Information in a review printout

- The information displayed in a review window
- Information formatted uniquely for each type of review window

Availability of review printouts for different types of patients

- Current patients
- Discharged or non-monitored patients: Patients who have been monitored by the Acuity System in the last 24 to 96 hours (depending upon your system configuration)

Print a review printout

To print a review printout

1. Open a review window for one of these types of patients:

- Current patient in local unit:
  In the patient's Virtual Monitor, click **Review**, and then select a review window.
- Non-monitored patient or patient in a networked Acuity System unit:
  a. In the Acuity Central Station screen's lower left corner, click .
  b. For a patient in the listed unit: Click the patient's name, and then click one of these review window buttons.

     For a patient in another unit: Click **Other Patients,** the patient's name, and then click one of these review window buttons.

Graphical Trends

Tabular Trends/ Events

Waveforms

OxyCRG

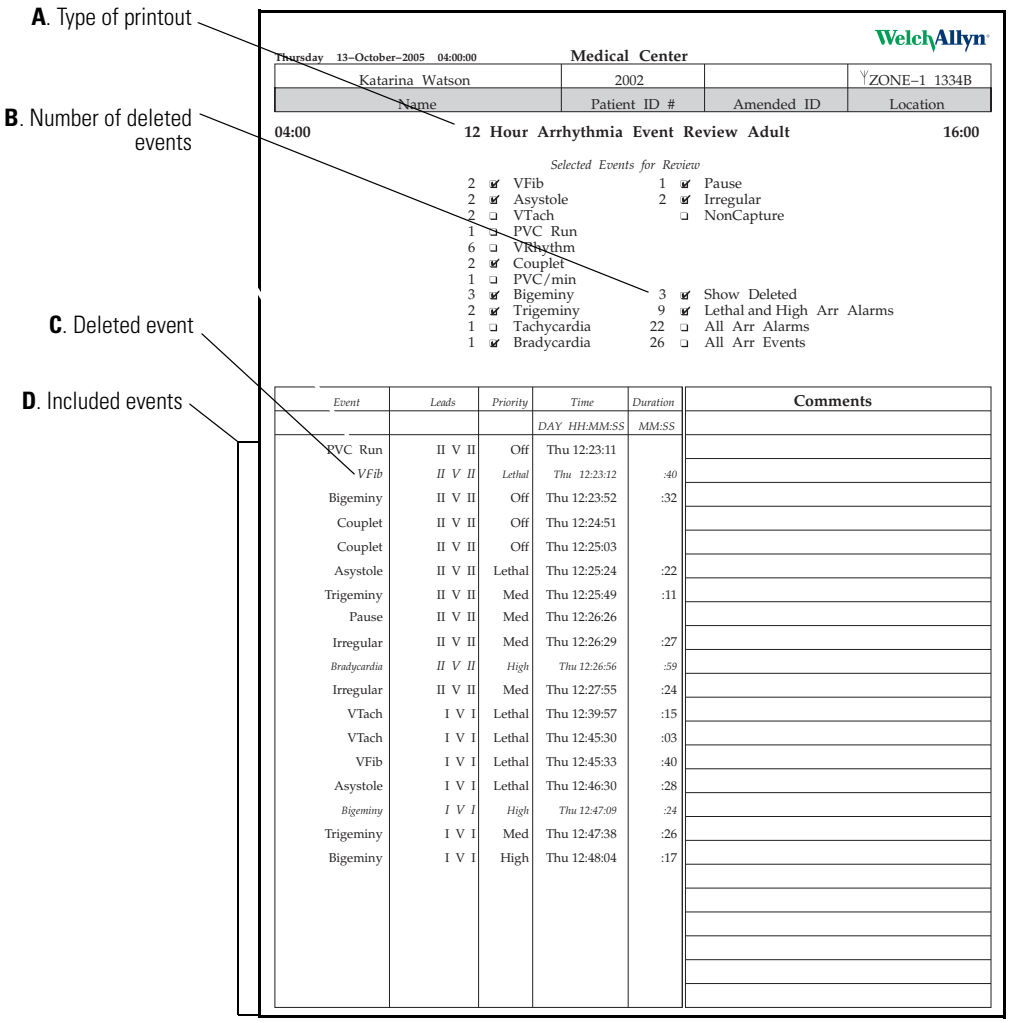
Arrhythmia Events

2. In the review window, click **Print**, and then click one of these printout types:

Review window	Review printout choices
Graphical Trends	Graph Table Summary
Tabular Trends/Events	Tabular Trends/Events (no selection is offered; Tabular Trends/Events is printed)
Waveforms	Waveforms Custom All leads
Arrhythmia Events	Waveforms Event List
OxyCRG	Graph (no selection is offered; Graph is printed)

Read a review printout

To read a review printout



A. Type of printout	The title of the review printout
B. Number of deleted events	Number of arrhythmia events that were deleted in the Arrhythmia Events Review window during the printed time span.
C. Deleted event	This event was deleted in the Arrhythmia Events Review window.
D. Included events	All events checked in the Arrhythmia Events Review window (and checked above) are listed in this printout.

Alarm printouts

If Print on Alarm is set for a patient's parameter and the parameter alarms, an alarm print occurs at the central station.

Information in an alarm printout

- Fourteen seconds before an alarm and seven seconds after an alarm
- The same waveforms that are selected for display in the Virtual Monitor

Types of alarm printouts

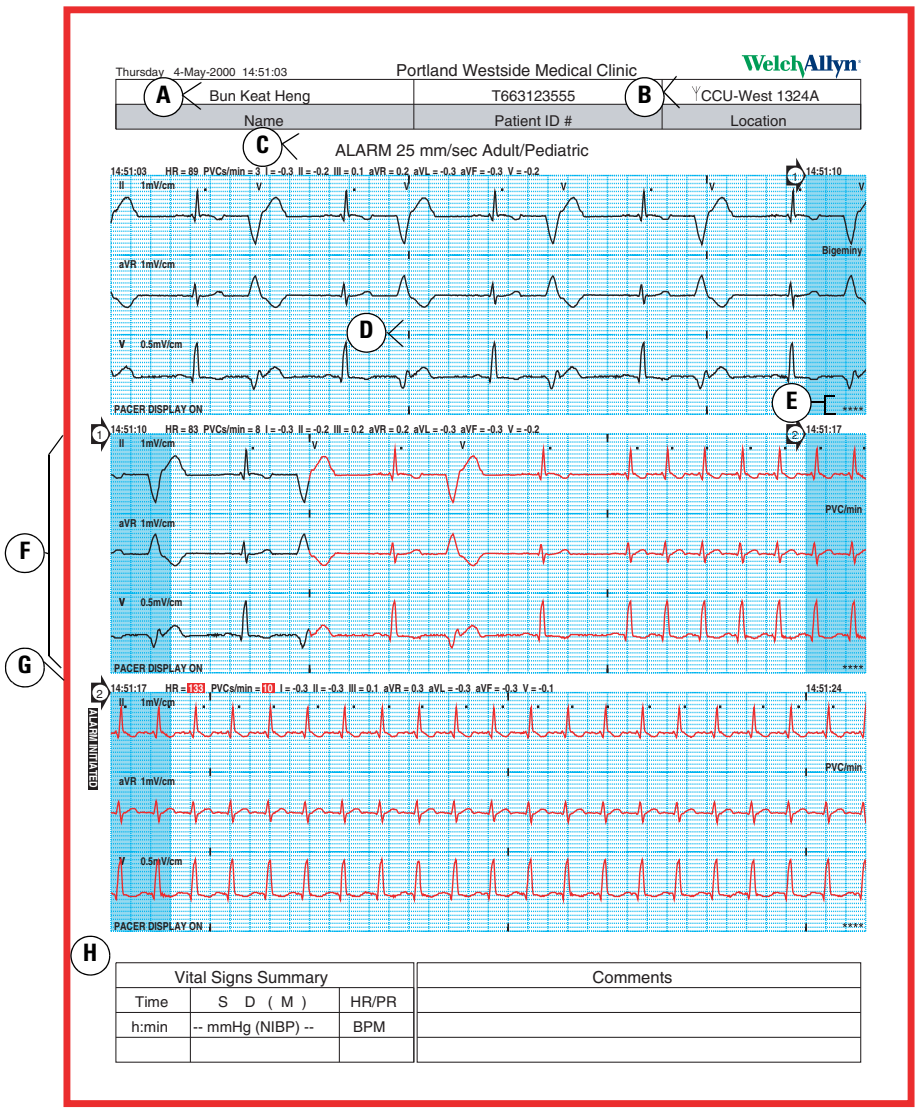
- Vital sign
- OxyCRG
- Arrhythmia event
- ST-segment deviation

Set printing on alarm

To learn how to set Print on Alarm for various parameters and events, see these pages:

- For vital sign and OxyCRG alarm printing, see "Adjust preferences for a patient's central station printouts" on page 49.
- For arrhythmia event alarm printing, see "Adjust preferences for a patient's arrhythmia alarming" on page 61.
- For ST-segment deviation alarm printing, see "Set alarm preferences for ST Analysis" on page 74.

Review an alarm printout



A. Patient name appears if patient is confirmed in the Acuity System.

B. Y indicates that this patient is monitored by a wireless monitor.

C. The type of printout

D. A three-second interval mark

E. An arrhythmia event marker was deleted for this waveform, in the Arrhythmia Events Review window.

F. Waveforms shown in a left shaded area are shown also in the preceding band's right shaded area.

G. The printout was initiated at this time.

H. The vital signs summary appears when three or less waveforms per strip are chosen for printouts. The box remains empty when no NIBP measurements have been taken within the last eight hours.

Patient List printouts

You can print lists of patients in your unit. If your system is part of an Acuity System network, you can print lists of patients in any units within the network.

Types of Patient List printouts

- Preadmitted patients: Patients pre-admitted to the Acuity System within the last 24 to 96 hours
- Current patients
- Discharged or non-monitored patients: Patients who have been monitored by the Acuity System in the last 24 to 96 hours (depending upon your system configuration)

Patients listed in Patient List printouts

To print a Patient List printout

1. In the lower left corner of the Acuity Central Station screen, click .

   The patients shown in the Patient List window are those assigned to your Acuity System unit.

2. Take one of these steps:

   - To print the current list, proceed to Step 4.
   - To list patients in another (networked) Acuity System unit, click **Other Patients**.

     The Other Patients List appears.

3. Click **Unit**, and then select the unit name from the box on the right.

   Patients are listed by unit.

4. Click a column heading to sort the list by name, location or ID.

   Actively monitored patients are listed at the top.

5. Click **Print List**.

   A printout occurs at the Acuity System printer.

12-lead printouts

You can perform 12-lead ECG interpretation and create printouts through the Welch Allyn 1500 Patient Monitor.

Note The 12-lead ECG interpretation measurements are not saved on the monitor and are printed out at the Acuity System printer. However, Acuity will support re-printing of the 12-lead reports. Files are saved for 96 hours.

Types of 12-lead printouts

- Average beats, 3x4 plus rhythm strip
- Average beats, 6x2 plus snippets for V1 through V6
- Automatic (sequential) 3x4 plus rhythm strip
- Automatic (sequential) 6x2
- Automatic (simultaneous) 3x4 plus rhythm strip
- Automatic (simultaneous) 6x2

Note The 12-Lead printouts in the 6x2 formats can print both Standard lead sequences and Cabrera lead sequences with the VR lead inverted. The 3x4 format always prints a Standard lead sequence.

Print a 12-Lead ECG printout

To print a 12-lead printout

1. Run a 12-lead analysis using the Welch Allyn 1500 Patient Monitor.

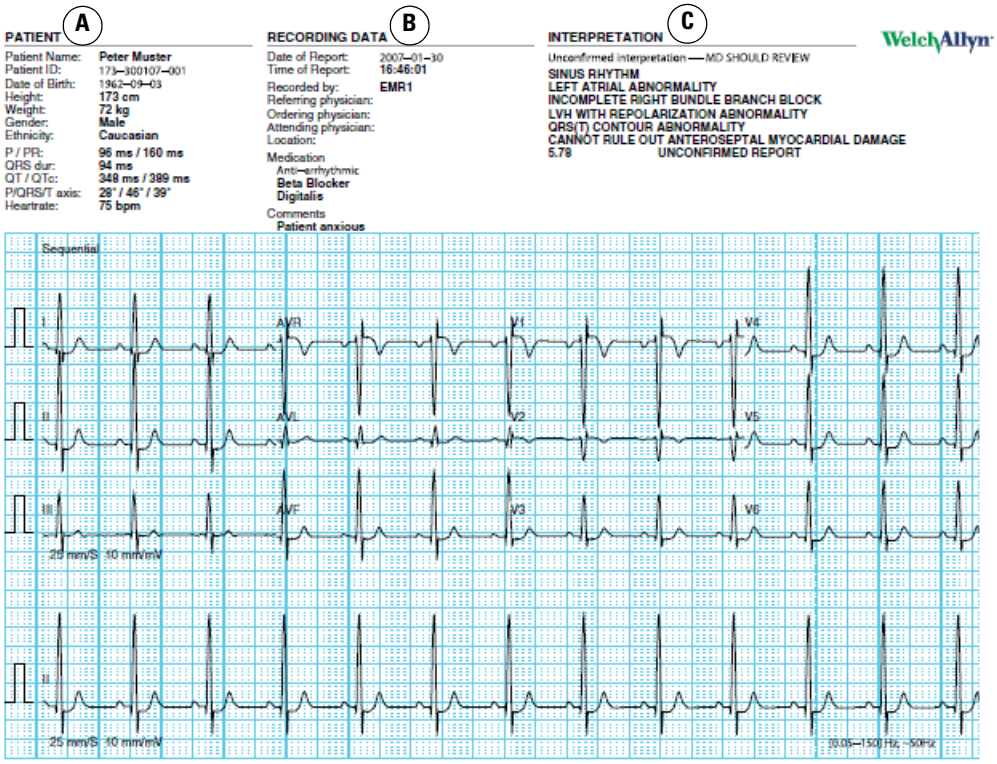
   Once the analysis is completed, the 12-lead report automatically prints at the Acuity System printer.

2. If a re-print of the last 12-lead analysis is needed, place the cursor under the 12-lead report event marker at the Waveform Review Window or the Graphical Trends Review Window.

   Click **Print** and select **12-Lead Report**.

   A printout occurs at the Acuity System printer.

Review a 12-lead report



A. Patient information appears if patient is confirmed in the Acuity System. This data includes extended demographics such as date of birth, height, weight, gender, ethnicity, and other measurements.

B. Print information. This data includes when the report was printed, clinician and physician information, and a list of medications the patient may be taking. A comment field is also available.

C. Interpretation information. This field displays the information generated by the Welch Allyn 1500 Patient Monitor regarding the analysis of the 12-lead report.

7 Move a monitored patient

You can move a monitored patient in these ways:

- Move a patient and monitor to a new room within the unit or transfer to a new unit within the same Acuity System network.
- Move a patient to a different monitor anywhere within the same Acuity System network.

If the patient's original Acuity System review information is still available within the Acuity System network (24 to 96 hours after disconnect), it is available in the new location after the move.

Patient data collected on the patient monitor during the move might transfer to the Acuity System, depending upon the monitor.

For information about patient monitors that are part of your Acuity System but are not shown in this chapter, consult the patient monitor manufacturer's literature.

Move the patient and monitor to a new location

You can arrange to move a patient and monitor to a new location in these ways:

- From the Acuity Central Station
- From a hardwired or wireless monitor.

If you would like to add a note to a patient's Waveform Window regarding a move, you can do so in the Patient ID Setup window. For instructions, see "Add or remove a note in a patient's Waveform Window" on page 81.

WARNING Always check alarm limits when a monitor reestablishes communication with the Acuity System. If you change limits at a monitor while it is not communicating with the Acuity System (for example, during transport or signal dropout), when you reestablish communication with the system, the limits might change to Acuity System Presets values.

Arrange a patient move from the Acuity Central Station

If you want to arrange a patient transfer to another unit, you must do so in the unit from which the patient is transferring.

To arrange a patient move from the Acuity Central Station

1. In the lower left corner of the Acuity Central Station screen, click .

   The Patient List window opens.

2. Click the patient name.

3. Click **Transfer**.

   The Transfer Patient window appears.

4. Click the unit name in the list, even if the patient will stay in the same unit.

5. Take one of these steps:

   - If you know the room number, click the new room.
   - If you do not know the room number, click **UNASSIGNED**.

     You can enter the room number later via the Patient List or the Virtual Monitor.

6. Click **Confirm**.

   If the patient is currently connected to a hardwired patient monitor, the information is stored at the Acuity Central Station and the patient map icon remains in the original position and state until the move takes place.

   If the patient is connected to a wireless patient monitor and transferred to a new unit, the patient map icon appears at the new central station. If you did not enter the room number, the icon remains in the yellow RM unconfirmed state until the room is confirmed.

Move patients and their hardwired monitors

Propaq CS monitor

Propaq Encore monitor

Welch Allyn 1500 Patient Monitor

To disconnect, move and reconnect a hardwired monitor to a new network connector

Throughout this procedure and the move, leave the monitor turned on.

1. On a Propaq CS monitor: Press **NET OFF** in the top left corner of the screen.

   On a Propaq Encore monitor: Press **NET OFF** on the top right corner of the casing.

   On a Welch Allyn 1500 Patient Monitor: Press the **Standby** key and select **Discontinue Monitoring.**

2. Within 15 seconds, remove the Acuity System network cable from the monitor.

   The monitor should disconnect from the Acuity System. If it does not, begin again at Step 1.

3. In the new location, connect the Acuity System network cable to the Acuity System network connector on the bedside monitor.

   The CONFIRM PATIENT? prompt appears.

4. Take one of these steps:

   - If the information in the CONFIRM PATIENT? prompt is correct, click **YES**.

     At the central station, the patient is confirmed with the new location.

   - If the information in the CONFIRM PATIENT? prompt is incorrect, click **NO** and see "To respond to the CONFIRM PATIENT? prompt" on page 30.

To switch a hardwired Propaq CS monitor to a wireless connection

WARNING When a hardwired Propaq CS monitor is disconnected from an Acuity System, if the monitor has wireless capability, it attempts to connect wirelessly to an Acuity System.

After connection, go to the Acuity Central Station where you want the monitor to have connected. Ensure that the patient monitor's icon appears on the central station map.

If it does not, contact your Biomedical Engineering department. If you are a biomedical engineer, see "Identify or change a monitor's network name (ESSID)" on page 161.

Throughout this procedure, leave the monitor turned on.

1. In the upper left corner of the Propaq CS monitor display, touch **NET OFF**.
2. Within 15 seconds, remove the Acuity System network cable from the Propaq monitor.

   The CONFIRM PATIENT? prompt appears when the monitor connects with an Acuity System.
3. Take one of these steps:
   - If the information in the CONFIRM PATIENT? prompt is correct, click **YES**.

     At the central station, the patient remains confirmed.

     If the patient is moving, see "To arrange a patient move from a wireless Propaq CS monitor" on page 128.
   - If the information in the CONFIRM PATIENT? prompt is incorrect, click **NO** and see "To respond to the CONFIRM PATIENT? prompt" on page 30.

Move patients and their wireless monitors

Micropaq monitor

Propaq LT monitor

Propaq CS monitor

Arrange a patient move from the patient monitor

To arrange a patient move from a Micropaq monitor

1. Press ▼ to highlight **ACUITY**, and then press ✓ to select it.
2. Take one of these steps:
   - Select **NEW ROOM** to move the patient to a new room within the unit, and then select a new room.

     The patient is confirmed with the new room.
   - Select **TRANSFER** to transfer the patient to a different unit, select the new unit, and then select the new room.

     The patient is confirmed and the patient's map icon appears at the new central station.

To arrange a patient move from a Propaq LT monitor

1. Press the arrow keys to underline Y at the top of the screen, and then press ⊙ to select it.
2. Select **Acuity menu**.
3. Take one of these steps:
   - Select **NEW ROOM** to move the patient to a new room within the unit, and then select the new room.

     The patient is confirmed with the new room.
   - Select **TRANSFER** to transfer the patient to a different unit, select the new unit, and then select the new room.

     The patient is confirmed and the patient's map icon appears at the new central station.

To arrange a patient move from a wireless Propaq CS monitor

1. From the main menu, touch **SETUP**, **ACUITY**, **PATIENT**.
2. Take one of these steps:
   - Select **NEW ROOM** to move the patient to a new room within the unit, and then select the new room.

     The patient is confirmed with the new room.
   - Select **TRANSFER** to transfer the patient to a different unit, select the new unit, and then select the new room.

     The patient is confirmed and the patient's map icon appears at the new central station.
3. (Optional) Switch a wireless Propaq CS monitor to a hardwired connection:

   a. Connect the Acuity System network cable to the Acuity System network connector on the bedside monitor.
   b. Connect the other end of the cable to the bedside network connector.

      The patient is confirmed and the patient's map icon appears in the new location.

Move the patient to a different monitor

You can move patients who are connected to hardwired or wireless monitors to different monitors within the same Acuity System network.

Move a patient from a hardwired monitor to a different monitor

1. On a Propaq CS monitor: Press **NET OFF** in the top left corner of the screen

   On a Propaq Encore monitor: Press **NET OFF** on the top right corner of the casing.

   On a Welch Allyn 1500 Patient Monitor: Press the **Standby** key and select **Discontinue Monitoring.**

2. Turn off the monitor.

   The trend information for this patient is erased from the monitor.

3. Connect the patient to a new monitor, and connect the monitor to the Acuity System.

   At the central station, the patient's yellow icon appears in an unconfirmed state on the map in the new location.

4. Enter or confirm the patient information.

   For instructions, see "Enter and confirm a patient's ID or room at the central station" on page 41.

Move a patient from a wireless monitor to a different monitor

To move a patient from a Micropaq monitor to a different monitor

1. On the Micropaq monitor, press ▼ to highlight **ACUITY,** and then press ✓ to select it.
2. Select **END TELE**.

   The monitor disconnects from the Acuity System.

3. Remove the battery from the Micropaq monitor.
4. Connect the patient to a new monitor, and connect the monitor to the Acuity System.

   At the central station, the patient's yellow icon appears in an unconfirmed state on the map.

5. Enter or confirm the patient information.

   For instructions, see "Enter and confirm a patient's ID or room at the central station" on page 41.

To move a patient from a Propaq LT monitor to a different monitor

1. On the Propaq LT monitor, press the arrow keys to underline ⅄ at the top of the screen, and then press ⦿ to select it.
2. Select **Acuity menu**.
3. Select **END TELE**.

   The monitor disconnects from the Acuity System.
4. Turn off the monitor.
5. Select **Delete & Shut Down**.

   The trend information for this patient is erased from the monitor.
6. Connect the patient to a new monitor, and connect the monitor to the Acuity System.

   At the central station, the patient's yellow icon appears in an unconfirmed state on the map.
7. Enter or confirm the patient information.

   For instructions, see "Enter and confirm a patient's ID or room at the central station" on page 41.

To move a patient from a wireless Propaq CS monitor to a different monitor

1. On the Propaq CS monitor, touch **NET OFF**.
2. Turn off the monitor.

   The trend information for this patient is erased from the monitor.
3. Connect the patient to a new monitor and connect the monitor to the Acuity System.

   At the central station, the patient's yellow icon appears in an unconfirmed state on the map.
4. Enter or confirm the patient information.

   For instructions, see "Enter and confirm a patient's ID or room at the central station" on page 41.

8 Discontinue Acuity System monitoring

Stop monitoring a patient

You can either temporarily interrupt or permanently stop patient monitoring.

For information about patient monitors that are part of your Acuity System but are not shown in this chapter, consult the patient monitor manufacturer's literature.

Temporarily interrupt monitoring

To temporarily interrupt monitoring a patient

1. Disconnect sensor cables from the monitor.

   Leave the monitor turned on. Equipment alert(s) appear.

2. Acknowledge (Disable) all equipment alerts.

   At the central station, the patient's map icon and windows are in the blue, "patient intentionally disconnected" state.

3. (Optional) Disconnect lead wires from patient electrodes, and disconnect electrodes from the patient.

4. When ready to resume normal monitoring, reconnect sensor cables to the monitor.

5. If necessary, apply lead wires to electrodes, and apply electrodes to the patient.

   The CONFIRM PATIENT? prompt appears.

6. Take one of these steps:

   - If the information in the CONFIRM PATIENT? prompt is correct, click **YES**.

     At the central station, the patient's windows return to the state that they were in before the disconnect.

   - If the information in the CONFIRM PATIENT? prompt is not correct, click **NO** and see "To respond to the CONFIRM PATIENT? prompt" on page 30.

WARNING If your system includes arrhythmia analysis, and if you connect, change or move an electrode, ensure that a RELEARN alert occurs at the patient monitor and the virtual monitor.

Moving or changing an electrode can change the beat morphology. If the system does not learn the new morphology, it might not alarm or it might cause false alarms. The relearn process establishes the new morphology as the normal ECG rhythm for arrhythmia and ST-segment analyses.

- If a RELEARN alert occurs after changing or moving an electrode, carefully evaluate the new ECG rhythm and the current ST segment for all active leads to make sure that the Acuity System has learned an appropriate rhythm. For evaluation instructions, see "Respond to a RELEARN alert" on page 90.
- If a RELEARN alert does not occur after changing or moving an electrode, initiate a relearn event. For instructions, see "To initiate relearn of a patient's ECG rhythm for arrhythmia and ST-segment analyses" on page 65.

WARNING Minimize patient movement during a RELEARN, as movement creates noise during the reading. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm. Ensure that the patient remains still for 5 minutes after the RELEARN before allowing them to move.

Permanently stop monitoring

To permanently stop monitoring a patient

1. From the monitor's Main Menu, take these steps.

   For Propaq CS and Encore monitors:

   a. In the top left or right corner of the monitor, press **NET OFF**.

      The monitor disconnects from the Acuity System.

   b. Turn off the monitor.

      The trend information for this patient is erased from the monitor.

For a Micropaq monitor:

   a. Press ▼ to highlight **ACUITY**, and then press ✓ to select it.

   b. Select **END TELE**.

      The monitor disconnects from the Acuity System.

   c. Remove the battery from the Micropaq monitor.

For a Propaq LT monitor:

   a. Press the arrow keys to underline Y at the top of the screen, and then press ⊙ to select it.

   b. Select **Acuity menu**.

   c. Select **END TELE**.

      The monitor disconnects from the Acuity System.

   d. Turn off the monitor.

   e. Select **Delete & Shut Down**.

      The trend information for this patient is erased from the monitor.

For a Welch Allyn 1500 Patient Monitor:

   a. Press the **Standby** key and select **Discharge Patient**.

      The patient is discharged from the Acuity System and the monitor enters standby mode.

   b. Turn off the monitor.

      The trend information for this patient is erased from the monitor.

2. Discharge the patient from Acuity System monitoring.

   For instructions, see "Discharge a patient from Acuity System monitoring" on page 134.

Discharge a patient from Acuity System monitoring

A patient's waveform and trend information is available for review and printing for 24 to 96 hours after Acuity System monitoring has stopped for the patient.

After the information is no longer available, the patient's name remains in the Patient List window until the patient is discharged from the Acuity System.

Discharge patients when the need for monitoring has passed. If a discharged patient's waveform and trend information remain in the system, it is still available for review and printing.

You cannot discharge a patient who is currently monitored by the Acuity System.

Note On a Welch Allyn 1500 Patient Monitor, selecting Discharge Patient from the Standby menu discharges the patient at the Acuity System.

To discharge a patient from Acuity System monitoring

1. At the Acuity Central Station from which the patient was monitored, in the lower left corner of the Acuity Central Station screen, click .
2. Click the patient's name.
3. Click **Discharge**.

   The Discharge Patient window appears.
4. Verify that this patient is to be discharged.
5. Click **Discharge**.

   The patient is removed from the Patient List when the patient's waveform and trend information no longer remain in the Acuity System.

9 Status icons

Status icon colors

The color of a status icon conveys the status of the patient, patient monitor or Central Station component that the icon represents.

Table 7. Colors of Acuity System status icons

Icon color	Meaning of icon color
Gray	Acuity System is not receiving patient information from this site because no communication is established.
Blue	When the icon represents Acuity System components, the components are operating successfully. When the icon represents an individual monitor, Acuity System is not receiving continuous heart rate or pulse rate information from it.
Green	This patient is successfully monitored. The patient and monitor are not in an alarm or alert state.
Yellow	Alert: When the icon represents an Acuity System component, the component is in an alert state. When the icon represents an individual patient/monitor, there is a monitor problem, or there is a setup problem with Patient ID, room number or alarm limits.
Red	Alarm: Surveillance is lost for this patient, or an alarm limit is violated.

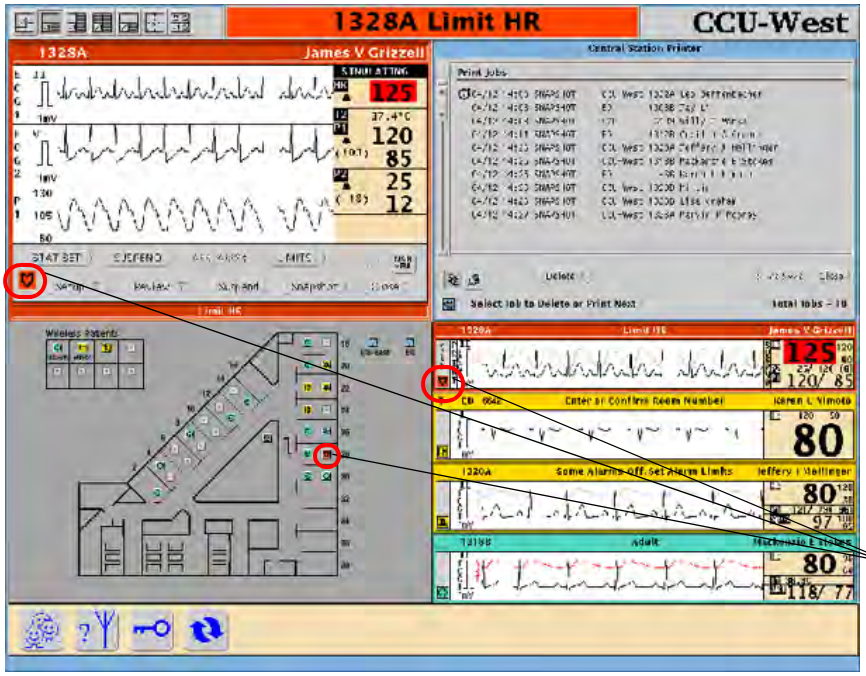
Patient/monitor status icons

Patient/Monitor status icons show status and act as buttons to open patient Virtual Monitors and Waveform Windows.

Locations of patient/monitor status icons

Patient/monitor status icons appear on the Acuity Central Station screen in these locations:

- On the map at patient locations
- In the corresponding Waveform Window
- In the corresponding Virtual Monitor



Opening patient windows by clicking patient/monitor status icons

You can open a patient's Waveform Window or Virtual Monitor by clicking patient/monitor status icons.

To open a patient's Waveform Window and Virtual Monitor

1. Click a patient's map icon to open the patient's Waveform Window.
2. Click one of these icons to open the patient's Virtual Monitor:
   - The patient/monitor status icon in the patient's Waveform Window
   - The patient's map icon

Note If you are viewing from a Patient List Review (PLR) station, see "To open a Waveform Window on a PLR station screen" on page 12 for instructions.

Patient/monitor status icons and recommended action

This table illustrates these things about patient/monitor status icons:

- Display priority
- Location on the central station map
- Messages at the top of the Acuity Central Station screen
- Messages in message panels (when present)
- Recommended action

Table 8. Icons and messages that represent patient and monitor status

Patient/monitor status icon	Icon display priority	Icon location on map	Messages in hallway message panels and at top of Acuity Central Station screen	Recommended action
Port Icon		Locations representing unused ports available for monitoring Acuity System patients.	None	When you are ready, begin monitoring from this location.
Monitor Connecting		Locations representing monitors establishing communication with Acuity System.	None	Wait until communication is established before you open the Virtual Monitor or Waveform Window.
Monitor Disconnecting		Locations representing monitors disconnecting from Acuity System.	None	If you have pressed the NET OFF key, unplug monitor from Acuity System within 15 seconds or Acuity System reconnects.
Patient Intentionally Disconnected		Locations representing monitors from which patients have been intentionally disconnected. This icon also appears during Manual NIBP-Only monitoring and spot SpO2 monitoring, but does not affect alarming at Acuity.	None	If communication between the patient and Acuity System is reestablished, the CONFIRM PATIENT? prompt appears. Click **YES** to reconnect the original patient to Acuity System.
Patient Monitoring OK	Beneath alerts and alarms	Locations representing patients/monitors that are not in an alarm or alert state.	None	
Auto NIBP-Only Monitoring	Beneath alerts and alarms	Locations representing monitors that are only monitoring NIBP, automatically.	None	

Table 8. Icons and messages that represent patient and monitor status

Patient/monitor status icon	Icon display priority	Icon location on map	Messages in hallway message panels and at top of Acuity Central Station screen	Recommended action
Alarm Tone Suspended with No Violation	Beneath alerts and alarms	Locations representing monitors with audible alarm tones suspended when no alarm or alert violation has occurred.	None	At the patient monitor, press the **Silence/Reset** key when ready. Or At the central station, click **Resume** in the patient's Virtual Monitor when ready.
color reflects current status of monitor Wireless		When the View Wireless button is pressed in the lower left corner of the Acuity Central Station screen, this icon appears in map locations where wireless monitors are actively communicating with Acuity System.	None	
Unconfirmed Patient ID	Low-level alert	Locations representing monitors with unconfirmed patient IDs.	None	In the patient's Virtual Monitor, click **Setup**, **Patient ID**. Confirm or enter ID information
Unconfirmed Room Number	Low-level alert	Wireless monitor map areas, representing patients with unassigned or unconfirmed room numbers.	None	In the patient's Virtual Monitor, click **Setup**, **Patient ID**. Confirm or enter a room number.
Some Alarm Limits Off	Low-level alert	Locations representing monitors with alarming for some vital signs set to off.	None	In the patient's Virtual Monitor, click **Setup**, **Alarms**. Set at least one upper and lower "limits-pair" per active vital sign.

Table 8. Icons and messages that represent patient and monitor status

Patient/monitor status icon	Icon display priority	Icon location on map	Messages in hallway message panels and at top of Acuity Central Station screen	Recommended action
Too Many Hardwired Monitors	Takes priority over low-level alerts.	Location representing the extra monitor.	[room #] Equipment	Audible alert tone continues until you disconnect a monitor. Disconnect a monitor not in use, or wait until another port becomes available to connect the extra monitor.
Monitor Cannot Communicate	Take priority over low-level alerts	Locations representing monitors that cannot communicate with Acuity System.	[room #] Equipment	Close the alert window and turn off or disconnect the monitor. Contact qualified service personnel.
Monitor Problem	Take priority over low-level alerts.	Locations representing problem monitors.	[room #] Equipment or more specific message	**At Acuity Central Station** 1. Check yellow Virtual Monitor for specific alert message. 2. If there is an audible tone, click **Suspend**. 3. If present, press one of these buttons: • **DISMISS** or **CONFIRM** to dismiss the alert message • **RESET** to reset the monitor 4. Correct the problem. If the problem persists, contact qualified service personnel. **At patient monitor** 1. Check for specific alert message. 2. If present, press one of these buttons: • **Acknowledge** to acknowledge the alert • **RESET** to reset the monitor • **DISABLE** to disable the alert 3. Correct the problem.

Table 8. Icons and messages that represent patient and monitor status

Patient/monitor status icon	Icon display priority	Icon location on map	Messages in hallway message panels and at top of Acuity Central Station screen	Recommended action
Monitor Communication Lost	Take priority over low-level alerts.	Locations representing problem monitors.	[room #] Loss of Comms	If the disconnect is intentional, click **Confirm**, and then close the alert window. Otherwise, reestablish communications between the patient monitor and the Acuity System.
Alert Tone Suspended	During suspension period, newly occurring alerts are indicated only after original alert is corrected. Acuity System only visually indicates newly occurring alarms by changing the Alert Tone Suspended icon from yellow to red.	Locations representing monitors with suspended audible alert tones.	[room #] Equipment or more specific message	Attend to problem. Then click the **Silence/Reset** key at the patient monitor or **Resume** at the central station Virtual Monitor.

Table 8. Icons and messages that represent patient and monitor status

Patient/monitor status icon	Icon display priority	Icon location on map	Messages in hallway message panels and at top of Acuity Central Station screen	Recommended action
 Patient Alarm or Telemetry Dropout	Take priority over alerts.	Locations representing monitors that are audibly alarming in response to one of these conditions: • Patient vital sign limit violations • Patient monitor is not communicating with the Acuity System.	[room #] VT ASYS VF APNEA Limit *vital sign* or [room #] Dropout	**Patient Alarm** Attend to the patient and suspend or silence the alarm tone. You can turn off or reset alarm limits also at the central station. Then click the **Silence/ Reset** key at the patient monitor. or **Resume** at the central station Virtual Monitor. **Telemetry Dropout** During this state, Arrhythmia and ST alarms are not indicated. 1. Click one of these buttons: • **SUSPEND** to suspend the alarm tone for 90 seconds • **RESET** to stop the alert and put the monitor in the blue, "patient intentionally disconnected" state, 2. Bring the wireless monitor within range of a wireless access point. 3. If the problem persists, contact qualified service personnel.
 No Continuous Heart/ Pulse Rate Source	Take priority over alerts.	Locations representing monitors that no longer receive continuous heart/ pulse rate signals. If monitoring began without an HR/PR source, the icon remains blue.	[room #] Source HR/PR	Reconnect the HR/PR source at the patient monitor. Silence or suspend the audible alarm tone.

Table 8. Icons and messages that represent patient and monitor status

Patient/monitor status icon	Icon display priority	Icon location on map	Messages in hallway message panels and at top of Acuity Central Station screen	Recommended action
Alarm Tone Suspended	Only lethal arrhythmia events interrupt the suspension period. All other newly occurring alarms are indicated only visually, and the icon image remains the same. Newly occurring alerts are not indicated.	Locations representing monitors for which audible patient alarm tones have been suspended and the alarm state is still active.	[room #] VT ASYS VF APNEA Limit *vital sign*	Attend to the problem, and then click the **Silence/Reset** key at the patient monitor. or **Resume** at the central station.

System component status icons

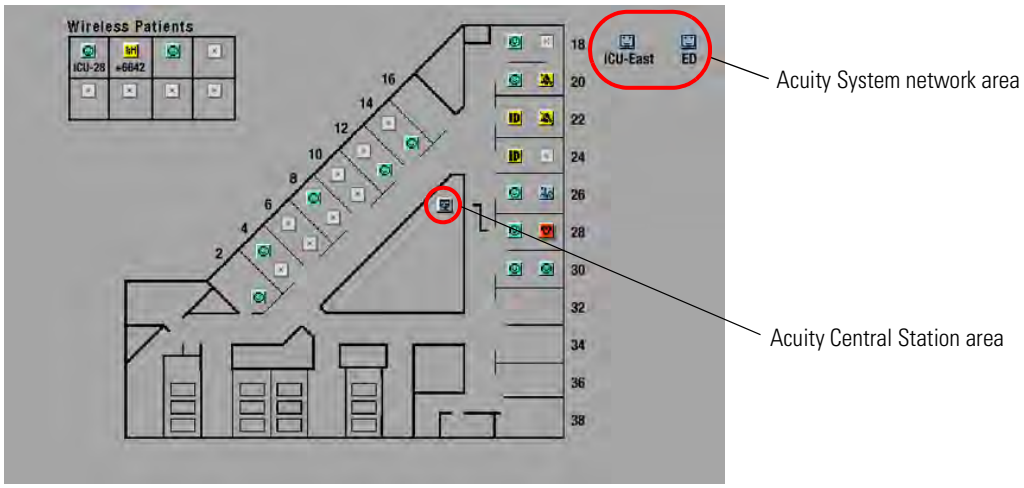
Acuity System component icons do these things:

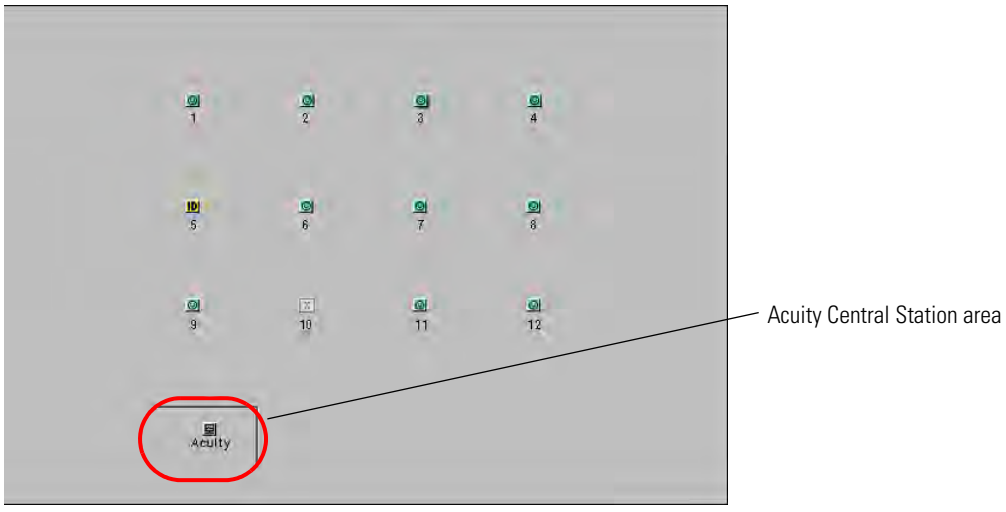
- Show component status
- Open Central Station windows (some icons)

Locations of system component icons

These icons appear in two places on the Acuity System map:

- At the Acuity Central Station area
- If your Acuity System is part of a network, at the Acuity System network area





Opening windows associated with system components

If you click some Central Station component icons on the map, the Central Station Printers window opens.

System component status icons and recommended action

This table illustrates these things about system component status icons:

- Display priority
- Location on the central station map
- Messages at the top of the Acuity Central Station screen
- Corresponding messages in message panels (when present)
- Recommended action

Table 9. Icons and messages that represent the status of Acuity System components

Acuity System component icon	Icon display priority	Icon location on map	Messages at top of Acuity Central Station screen	Recommended action
Acuity Central Station Components OK	Beneath alerts and alarms	Acuity Central Station area	None	Click this icon to open the Central Station Printers window.
Networked Acuity System OK	Beneath alerts and alarms	Acuity System network area if your system is part of an Acuity network	None	
Connectivity Server (WACS) OK	Beneath alerts and alarms	Optionally at Acuity Central Station area if your system includes a Welch Allyn connectivity server (WACS)	None	
Central Component(s) Problem	Low-level alert	Acuity Central Station area	Equipment Also various messages in hallway message panels	Contact qualified service personnel.
Hallway Message Panel Problem	Low-level alert	Acuity Central Station area	Check Panel	Contact qualified service personnel.
Acuity System Disk Problem	Low-level alert	Acuity Central Station area	Call Service	Contact qualified service personnel.
Acuity System Network Problem	Low-level alert, but in certain circumstances no other alarms or alerts can occur during this alert.	Acuity Central Station area	Check Network	Contact qualified service personnel.

Table 9. Icons and messages that represent the status of Acuity System components

Acuity System component icon	Icon display priority	Icon location on map	Messages at top of Acuity Central Station screen	Recommended action
Central Printer Problem Central Printers OK	Low-level alert	Yellow icon: appears at Acuity Central Station area and in the Central Station Printer window if printer has a problem. Blue icon: appears only in the Central Station Printer window. Indicates that the printer is normal.	Yellow icon: Check Laser Printer or Printing Disabled	Click the yellow icon to open the Central Station Printer window, and click to open the Printers View. Determine the problem. Check all printers. If necessary, contact qualified service personnel regarding printer status or to redirect print jobs to an alternate printer.
Networked Acuity System Problem or Connectivity Server Unavailable	Low-level alert	Acuity System network area or Acuity Central Station area	Check Network	There is a problem with a networked Acuity System, or the Welch Allyn connectivity server (WACS) is unavailable. Contact qualified service personnel.
Unrecognized Networked Acuity System	Low-level alert	Acuity System network area	None	Represents a networked Acuity System that is unknown to your Acuity System. Software versions do not match. Contact qualified service personnel.
Some Connectivity Services Unavailable	Low-level alert	Acuity Central Station area	Call Service	Some services associated with the Welch Allyn connectivity server (WACS) are unavailable. Contact qualified service personnel.
Too Many Wireless Monitors	Low-level alert	Acuity Central Station area	Too Many Monitors Also shown in hallway message panels.	Disconnect a wireless monitor.

Table 9. Icons and messages that represent the status of Acuity System components

Acuity System component icon	Icon display priority	Icon location on map	Messages at top of Acuity Central Station screen	Recommended action
No Devices Running Clinician Notifier are Reachable	Low-level alert	Acuity Central Station area	Notifier Fault	System includes a Welch Allyn connectivity server (WACS) with the AcuityLink option. Mobile devices that are running Clinician Notifier software are not reachable. All devices are logged off, turned off or out of range, or the AcuityLink network is unavailable. Contact a clinical administrator and qualified service personnel.

10 Troubleshooting and maintenance

Contact information

If you are unable to find the answer to a question, or if you encounter a problem that cannot be corrected by ordinary operating procedures described in this manual, please contact Welch Allyn Technical Services:

Phone (within the U.S.A.):	1 800 289 2501
Phone (worldwide):	+1 503 530 7500, ask for Technical Service
Fax:	+1 503 526 4970
e-mail:	solutions@welchallyn.com
Internet	http://www.welchallyn.com/support/default.htm

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Troubleshooting

Central station displays

Table 10. Troubleshooting the central station display

Problem	Explanation
One or more of the Acuity Central Station screens are blank or frozen, or some Virtual Monitors have changed color or disappeared	As a preventative measure, the Acuity Central Station monitors its central processing unit (CPU) software performance levels. If it detects that the software is not performing at desired levels, it restarts (auto-reboots) in a controlled sequence, to return the software to normal operation. Paired Acuity Systems include a second, high-availability (HA) CPU for back-up monitoring in the case of monitoring interruption. If one CPU of an HA pair ceases operation, the other CPU assumes control of the Acuity Central Station display(s). A yellow indicator on a display shows that an HA CPU "switchover" has occurred, and the display is receiving input from the HA CPU (for details, see page 13). In both cases, on the Acuity Central Station display(s), typically some virtual patient monitors re-appear quickly and the rest appear one-by-one over the next one to three minutes. Some Virtual Monitors may take approximately five minutes to re-appear. **To respond to an HA CPU switchover** 1. If a Virtual Monitor appears in a new yellow alert state, take these steps to return it to the green state: (a) Read the message to confirm the patient identity. (b) Click the appropriate button. **WARNING**. If normal central processing unit (CPU) operation is interrupted (for example, during CPU maintenance, scheduled and unscheduled reboots, power loss or a high-availability (HA) CPU switchover period), central station monitoring and analysis temporarily stop. The Acuity System cannot collect patient review data during the interruption period. That data becomes permanently unavailable. Auto-reboots and HA CPU switchovers occur infrequently, but poor environmental conditions and failure to perform preventative maintenance can increase frequency of occurrence. Whenever an interruption in Acuity System CPU operation occurs, please contact Welch Allyn Technical Service soon to ensure that your entire system has returned to normal operating condition and that it does not require further service.
No audible alarm or alert tones are coming from the central station display.	Look for a mute button on the display, and push it to restore sound. Contact your Biomedical Engineering department if tones are not restored. **WARNING** If an Acuity Central Station display is intentionally or inadvertently muted, alarm and alert tones do not occur at the display. If your central station display includes audible tones, remain aware of whether they are occurring. If they appear to have stopped, ensure that tones are restored. **WARNING** Ensure that nothing is connected into the headphone jack of the central station computer. A connection in this jack will mute any audible tones from the display or the computer.

Table 10. Troubleshooting the central station display

Problem	Explanation
A menu that I do not recognize appears on the Acuity Central Station screen.	Acuity System Engineering menus are large, gray menus with only a password entry line enabled: they appear along the left side of the Acuity System screen. These menus are meant for use only by trained, authorized Welch Allyn service personnel. Unauthorized use of these menus can result in unsafe alteration of the Acuity System, including shut-down of the system. If you inadvertently open a menu that you do not understand and that is not explained in this manual, please disregard the menu and clear it from the screen by pointing anywhere outside the menu and clicking on the left mouse or trackball key.

Connection, patient room and patient ID

Table 11. Troubleshooting connection, patient room and patient ID

Problem	Explanation
When I connected a wireless monitor to the Acuity System, its map icon went into the room that I had assigned it. But now it isn't in the room anymore, and it's a RM icon, meaning the patient hasn't been assigned a room. What happened?	After your patient's icon was successfully assigned to a room, a patient connected to a hardwired monitor was assigned the same room, so your patient was "kicked out." Assign another room to your patient.
When I connect a monitor to the Acuity System, does not appear on the Acuity Central Station screen.	Ensure that you make a proper connection with the bedside network connector. If it takes more than a few seconds for the Monitor Connecting icon to appear, disconnect the Acuity System network cable from the Acuity System network connector on the Propaq monitor, and then reconnect. If the icon still does not appear, call Welch Allyn Technical Services department.
When I reconnect a wireless monitor patient to the Acuity System, the patient's map icon disappears for a few seconds before the icon appears.	This is normal in this circumstance. Simply wait the 20 seconds or so until the Unconfirmed Patient ID icon appears.
Sometimes patients are assigned an ID number that I didn't give them.	If you do not enter a patient ID number, after (up to) five minutes the Acuity System might generate an automatic patient ID number for you. The number is created from the room number (or for wireless monitors, part of the serial number of the monitor), and the time. If you want to change the ID number, see "Edit a patient ID number: add an amended (revised) patient ID" on page 80.
A patient is being monitored with a wireless monitor, and I can't find the patient's data on the central monitor. Alarms are occurring for the patient at the patient monitor, but not at my unit's Acuity Central Station.	A network name is specified for all wireless patient monitors. If the network name does not match the network name of your Acuity System network, the alarms could be occurring at another Acuity System. Contact your Biomedical Engineering department. If you are a biomedical engineer, see "Identify or change a monitor's network name (ESSID)" on page 161.

Equipment alerts

Table 12. Troubleshooting equipment alerts

Problem	Explanation
When I connect a monitor to the Acuity System, a Communication Alert message occurs.	Only monitors with Acuity System network connectors on their sides, with Acuity System authorization and with software versions indicated in Table 19 on page 171 can communicate with the Acuity System. For compatibility with other monitors, contact your Welch Allyn representative. Confirm the monitor's software version by reading the start-up screen when the monitor is turned on. There is no visual indication that the monitor has Acuity System authorization. If this problem continues, contact qualified service personnel.
The patient monitor displays a "Network Fault" message after I press NET OFF and disconnect from the Acuity System.	Acknowledge (or **Disable**) the alert. If you wait a few seconds after selecting NET OFF, and then remove the Acuity System cable from the patient monitor, you can prevent this alert.
At the Acuity Central Station, a patient's Virtual Monitor is in the yellow alert state or red alarm state, and it shows a CHECK WIRELESS or TELEMETRY DROPOUT message.	1. If there is an audible tone, click **Suspend** to suspend the alarm tone. 2. Click whichever of these buttons is present: • **CONFIRM** to dismiss the alert message for a number of hours • **RESET** to dismiss the alert and put the monitor in the blue, "patient intentionally disconnected" state 3. Bring the wireless monitor within range of a wireless access point. 4. If the problem persists, contact qualified service personnel.
While an alert is occurring at the Acuity Central Station, one or more hallway message panels are displaying a different message.	Each message panel might be programmed differently, or a panel has lost network communication, and it is displaying a message that was displayed at the time of the loss. Contact qualified service personnel.
When I change the Acuity System screen view after it has not been changed for several hours, a Monitor Communication Lost alert occurs briefly for one or more monitors, and then Unconfirmed Patient ID status follows.	After the monitors reconnect, click **YES** in the CONFIRM PATIENT? prompt to confirm the patient's identification.
An NIBP equipment alert is suspended, and then an NIBP measurement is taken. The audible alert tone recurs after 90 seconds.	Go to the patient to investigate the cause of any NIBP equipment alert. Acknowledge the alert, and then correct the problem.
An equipment problem occurred during a patient alarm, but I was not notified.	**WARNING** During an alarm or alert suspension period, be aware of new visual alarm indications that might occur on the patient monitor or Virtual Monitor. During a suspension period, these things occur at the Virtual Monitor and patient monitor: • Audible tones are suspended for 90 seconds unless RESUME is clicked at the central station or the alarm tone is reset at the patient monitor. • Alarms for life threatening events—apnea, asystole, ventricular tachycardia, and ventricular fibrillation—override the suspend state. • All other new alarms for the same patient are indicated only visually, by additional red numeric highlights and arrhythmia or ST status messages. • New equipment alerts are indicated only after the first alarm and alert conditions are corrected.

Table 12. Troubleshooting equipment alerts

Problem	Explanation
A Cuff Not Detected or a No Pulses Detected equipment alert is occurring at both the patient monitor and Virtual Monitor, but NIBP is not being monitored.	This condition usually occurs for one of these reasons: • The monitor wasn't turned off and on again to clear settings (including Auto NIBP) before the new patient was connected to it. • The monitor was turned off, but CURRENT SETTINGS (including Auto NIBP) were saved via the monitor's SYSTEM Menu. When a patient monitor is set in the auto NIBP mode, the monitor initiates measurements at the selected auto interval, even when the cuff is not on the patient. 1. At the patient monitor, Acknowledge the alert. 2. Press **NIBP**, **MANUAL** to change the NIBP setting to Manual. 3. Save the current settings to ensure that the problem doesn't persist after you turn off the monitor. For instructions, refer to the monitor directions for use.

Alarm limits

Table 13. Troubleshooting alarm limits

Problem	Explanation
I set specialized alarm limits before the patient ID was confirmed, and the limits changed after confirmation.	**WARNING** Before you set customized alarm limits for a patient, confirm the patient's ID and room number. Otherwise, customized limits might be lost.
After I disconnected a patient for transport, I changed the patient's alarm limits at the patient monitor. When I reconnected the monitor to the Acuity System, the alarm limits changed from what I had set.	**WARNING** Always check alarm limits when a monitor reestablishes communication with the Acuity System. If you change limits at a monitor while it is not communicating with the Acuity System (for example, during transport or signal dropout), when you reestablish communication with the system, the limits might change to Acuity System Presets values.
When I adjust arrhythmia alarm limits, sometimes heart rate limits change, too.	**WARNING** If you set the bradycardia alarm limit higher than the HR lower limit, the Acuity System adjusts the HR lower limit to the new bradycardia limit. If you set the tachycardia limit lower than the HR upper limit, the Acuity System sets the HR upper limit to the new tachycardia limit. In either case, a message appears in the upper border of the Arrhythmia Alarms Setup window telling you HR alarm limits have changed.

Patient alarm indications

Table 14. Troubleshooting patient alarm indications

Problem	Explanation
False arrhythmia alarms are occurring because of a patient's abnormal beat morphology.	The Acuity System analyzes patient ECG data to detect specific changes in cardiac rhythms. The system uses up to three ECG leads to detect normal beats, ventricular beats and to analyze arrhythmias. If false arrhythmia alarms are occurring due to a patient's unique beat morphology, and if you are using a 5-wire ECG cable, you can direct the Acuity System to analyze arrhythmias using one reliable lead. 1. In the patient's Virtual Monitor, click **Review**, **Waveforms.** The Waveforms Review window appears. 2. Check all of the lead boxes to view waveforms shown from each lead. 3. Note the lead that is most reliable for arrhythmia analysis. 4. Click **Setup**, **Arrhythmia Alarms**. The Arrhythmia Alarms Setup window appears. 5. Under Options, locate the Single ECG box. 6. Next to the Single ECG box, click the arrow and select the most reliable lead for arrhythmia analysis. A relearn occurs in the next step. 7. Check the **Single ECG** box. A RELEARN alert occurs at the patient's Virtual Monitor and Waveform Window. The alert remains until relearn is finished. 8. Carefully evaluate the new ECG rhythm to ensure that the Acuity System has learned an appropriate rhythm. For evaluation instructions, see "Respond to a RELEARN alert" on page 90. **WARNING** If you turn on Single ECG in response to false lethal arrhythmia alarming (for example, due to bundle branch block or irregular rate), arrhythmia analysis is limited to one lead. Typically, 3 lead analysis (via a 5-wire cable) is optimal.
HR alarms are occurring at an unusually high level at the patient monitor, sometimes erroneously, and the Acuity Central Station doesn't show some or all of the HR alarms. The system includes Arrhythmia Analysis.	Acuity Systems that include an Arrhythmia Analysis option measure HR using arrhythmia algorithms, whereas the monitor uses a single lead. Thus the patient monitor can display a higher heart rate, perhaps due to noise or artifact, which can result in more frequent HR alarms than the Acuity Central Station displays. If the patient monitor is a Propaq LT, CS or Encore, and if the patient has a high-quality pulse oximetry waveform, you can attempt to reduce HR alarming by changing the HR source to SpO_2. For example, from the Propaq monitor's main menu, press **SETUP**, **MORE**, **NEXT** to highlight the selected source, and then **CHANGE** to highlight SpO_2. **WARNING** All heart rate alarms are valid, even if the HR value at the central station differs from that at the monitor. If your system includes an Arrhythmia Analysis option, the Acuity System heart rates for adult and pediatric patients are a result of system software analysis. The HR/PR numeric changes to "---" in the Virtual Monitor, Waveform Window, review windows, and system printouts when the system detects ventricular fibrillation or asystole. However, an apparently valid heart rate numeric might show in the patient monitor.

Table 14. Troubleshooting patient alarm indications

Problem	Explanation
A false alarm occurred for Heart rate, ECG, ST analysis or arrhythmia analysis.	**WARNING** Ensure these things to minimize false HR, Arrhythmia Analysis and ST Analysis alarms, and to achieve optimal event detection and analysis: •ECG cable, lead wires and electrodes are undamaged. •Patient's skin is properly prepared. •Electrodes are placed using standard good practices. •5-wire ECG cable is used. A 3-wire cable limits arrhythmia and ST-segment analyses to a single lead, and ST analysis is disabled when a lead failure occurs. •LL electrode is connected. Otherwise, only one ECG lead is available and arrhythmia and ST-segment analyses are effected. •Patient monitor and Virtual Monitor display these things: -HR numeric and ECG waveform -Non-noisy signal. If signal is noisy, reduce patient movement and increase distance from other electrical devices. -Correct patient mode for the patient •Virtual Monitor ECG 1 and ECG 2 display these things: -ECG waveform -Waveform amplitude at least 160 µV, peak-to-peak -QRS complex amplitude at least twice the P or T wave amplitude **WARNING** If your system includes arrhythmia analysis, and if you connect, change or move an electrode, ensure that a RELEARN alert occurs at the patient monitor and the virtual monitor. Moving or changing an electrode can change the beat morphology. If the system does not learn the new morphology, it might not alarm or it might cause false alarms. The relearn process establishes the new morphology as the normal ECG rhythm for arrhythmia and ST-segment analyses. •If a RELEARN alert occurs after changing or moving an electrode, carefully evaluate the new ECG rhythm and the current ST segment for all active leads to make sure that the Acuity System has learned an appropriate rhythm. For evaluation instructions, see "Respond to a RELEARN alert" on page 90. •If a RELEARN alert does not occur after changing or moving an electrode, initiate a relearn event. For instructions, see "To initiate relearn of a patient's ECG rhythm for arrhythmia and ST-segment analyses" on page 65. **WARNING** Minimize patient movement during a RELEARN, as movement creates noise during the reading. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm. Ensure that the patient remains still for 5 minutes after the RELEARN before allowing them to move.
Alarms are not occurring for some alarm limit violations.	Check the Alarms Setup window to see if some limits have been turned off. **WARNING** Patients for whom alarming has been turned off must be kept under close physical surveillance. Turning off alarming disables both audio and visual alarm indicators. **WARNING** Do not use Stat Set or Auto Set for a patient in an alarm state! Use these buttons only when your patient's vital sign values are in an acceptable range.The buttons adjust alarm limits based on the patient's current vital-sign values.

Table 14. Troubleshooting patient alarm indications

Problem	Explanation
Audible alarm or alert tones are delayed at the patient monitor. However, visual indications at the patient monitor and Acuity Central Station occur at the same time.	To minimize disturbance to patients, a 10-second delay occurs before an alarm or alert tone sounds at most patient monitors connected to the Acuity System network. **WARNING** Audio tones at a patient monitor in pediatric or adult mode might be suppressed by the Acuity System for up to four minutes and 15 seconds, depending on choices made during Acuity System installation. For further information, see the monitor directions for use. Visual indications at the patient monitor are not suppressed.
After an audible alarm tone is suspended and another vital sign alarm occurs for the same patient, a new tone does not occur until the original 90 seconds has lapsed.	**WARNING** During an alarm or alert suspension period, be aware of new visual alarm indications that might occur on the patient monitor or Virtual Monitor. During a suspension period, these things occur at the Virtual Monitor and patient monitor: • Audible tones are suspended for 90 seconds unless RESUME is clicked at the central station or the alarm tone is reset at the patient monitor. • Alarms for life threatening events—apnea, asystole, ventricular tachycardia, and ventricular fibrillation—override the suspend state. • All other new alarms for the same patient are indicated only visually, by additional red numeric highlights and arrhythmia or ST status messages. • New equipment alerts are indicated only after the first alarm and alert conditions are corrected. Additionally, these indications occur: • On hallway message panels and in the message window at the top of the Acuity System screen, if a new alarm is higher priority than one already shown on the panels, it replaces the first alarm. • At the patient monitor, a short "blip" tone can occur if a new arrhythmia alarm is a higher level than a suspended alarm.
Patient status icon does not change to when a patient alarm is suspended.	**WARNING** Always identify the source of an alarm before you suspend it. When an NIBP alarm is suspended or silenced, the window borders and icon colors at the central station are the pre-alarm color instead of the typical red "Alarm Suspended" status. The patient alarm might have been an NIBP alarm. When an NIBP alarm is suspended, changes color to reflect the patient status before the alarm.
When I click the bar in a Waveform Window to remove a latched alarm, the alarm remains.	If you attempt to remove a latch for an alarm condition that is still active, the visual latch remains.
SpO_2 false alarms are occurring.	Poor sensor placement, a patient's poor circulation, frequent arrhythmias, or excessive patient movement can increase the frequency of false alarms. If the problem persists after you have corrected sensor placement, try changing the SpO_2 RESPONSE time to **SLOW** and C-LOCK® to **OFF**.

Heart rate and ECG displays

Table 15. Troubleshooting heart rate and ECG displays

Problem	Explanation
Heart rate values on the patient monitor differ from HR values at the Acuity Central Station. or --- appears instead of the HR/PR numeric reading.	**WARNING** All heart rate alarms are valid, even if the HR value at the central station differs from that at the monitor. If your system includes an Arrhythmia Analysis option, the Acuity System heart rates for adult and pediatric patients are a result of system software analysis. The HR/PR numeric changes to "---" in the Virtual Monitor, Waveform Window, review windows, and system printouts when the system detects ventricular fibrillation or asystole. However, an apparently valid heart rate numeric might show in the patient monitor.
ECG signal interruption is occurring.	Unsupported or stressed ECG cables or electrodes can result in movement artifact. In addition, if the patient is monitored by a wireless monitor, various environmental variables can interfere with wireless signal transmission. **WARNING** Use wireless monitors only on patients who can tolerate intermittent monitoring interruptions. All wireless systems are prone to intermittent signal dropout. During signal dropout periods, arrhythmia and ST-segment analyses cannot be performed, and the Acuity System does not show alarms or alerts.
The Virtual Monitor shows the same lead for ECG1 and ECG2.	**WARNING** Always replace disconnected lead wires immediately. If a lead wire becomes disconnected and a second lead is not available, the Virtual Monitor might show the same lead for ECG1 and ECG2.
A patient's HR numerics and ECG waveform are not displayed at the Acuity Central Station.	Verify that the patient's ECG leads are effectively applied.

CO_2, SpO_2 and NIBP displays

Table 16. Troubleshooting CO_2, SpO_2 and NIBP displays

Problem	Explanation
An NIBP reading seems inaccurate.	**WARNING** If a noninvasive blood pressure reading is suspect, repeat the measurement, watching a manometer (if the monitor has one) to verify the reading. If you are still uncertain about the reading, use another method.
When I try to change CO_2 units at the patient monitor, a message says I must use the Acuity System units.	CO_2 units are an Acuity System installation choice set by your system administrator. Acuity System requires a single CO_2 unit to ensure that the CO_2 units are displayed correctly.
When I select SpO_2 as the pulse rate source, ECG remains the source.	When ECG is monitored and C-LOCK is on, ECG is chosen as the heart rate source.
SpO_2 or NIBP are not displayed in the Virtual Monitor when I try to turn on either for display.	You can select up to three waveforms for display. If you select more than three, the three highest priority waveforms are displayed. ECG is always displayed when it is monitored, and P1, P2, and CO_2 take priority over other selections. If you want to display SpO_2 or NIBP, turn off P1, P2 or CO_2. In addition, NIBP numerics display for only one hour after an NIBP measurement is taken.
"??:??:??" is shown to indicate the time of an NIBP measurement.	This occurs under either of these circumstances: • The monitor was connected to the Acuity System during NIBP measurement, and the monitor was then disconnected from and reconnected to the Acuity System. • The monitor was not connected to the Acuity System during NIBP measurement, and then the monitor was connected to the Acuity System. Open the NIBP status window at the patient monitor to read the time of the NIBP value.
When NIBP measurements are taken while a monitor is temporarily disconnected from an Acuity System, the NIBP values are not transferred to the Acuity System review windows.	If an NIBP measurement is taken within two minutes before connection to an Acuity System or two minutes following disconnection from an Acuity System, the reading might not transfer to the Acuity System. Take NIBP measurements after the monitor is connected to the Acuity System, to ensure NIBP trending.

Arrhythmia Analysis and ST Analysis

Table 17. Troubleshooting arrhythmia and ST-segment analyses

Problem	Explanation
Arrhythmia analysis or ST analysis does not seem to be optimal.	**WARNING** Ensure these things to minimize false HR, Arrhythmia Analysis and ST Analysis alarms, and to achieve optimal event detection and analysis: •ECG cable, lead wires and electrodes are undamaged. •Patient's skin is properly prepared. •Electrodes are placed using standard good practices. •5-wire ECG cable is used. A 3-wire cable limits arrhythmia and ST-segment analyses to a single lead, and ST analysis is disabled when a lead failure occurs. •LL electrode is connected. Otherwise, only one ECG lead is available and arrhythmia and ST-segment analyses are effected. •Patient monitor and Virtual Monitor display these things: -HR numeric and ECG waveform -Non-noisy signal. If signal is noisy, reduce patient movement and increase distance from other electrical devices. -Correct patient mode for the patient •Virtual Monitor ECG 1 and ECG 2 display these things: -ECG waveform -Waveform amplitude at least 160 µV, peak-to-peak -QRS complex amplitude at least twice the P or T wave amplitude **WARNING** If your system includes arrhythmia analysis, and if you connect, change or move an electrode, ensure that a RELEARN alert occurs at the patient monitor and the virtual monitor. Moving or changing an electrode can change the beat morphology. If the system does not learn the new morphology, it might not alarm or it might cause false alarms. The relearn process establishes the new morphology as the normal ECG rhythm for arrhythmia and ST-segment analyses. •If a RELEARN alert occurs after changing or moving an electrode, carefully evaluate the new ECG rhythm and the current ST segment for all active leads to make sure that the Acuity System has learned an appropriate rhythm. For evaluation instructions, see "Respond to a RELEARN alert" on page 90. •If a RELEARN alert does not occur after changing or moving an electrode, initiate a relearn event. For instructions, see "To initiate relearn of a patient's ECG rhythm for arrhythmia and ST-segment analyses" on page 65. **WARNING** If you turn on Single ECG in response to false lethal arrhythmia alarming (for example, due to bundle branch block or irregular rate), arrhythmia analysis is limited to one lead. Typically, 3-lead analysis (via a 5-wire cable) is optimal. **WARNING** In some clinical environments and due to some physiologic differences among patients, the Acuity System might not alarm for occurrences of ventricular tachycardia, ventricular fibrillation, or asystole. For instance, asystole is defined as an absence of any detected beat for four or more seconds. Patient pathologies where indications of electrical activity continue to exist without adequate cardiac function might not be recognized as asystole. **WARNING** Turning off alarming for arrhythmia types and ST Analysis disables both audio and visual alarm indicators. Although alarming for lethal arrhythmias cannot be turned off, patients susceptible to arrhythmias must be kept under close physical surveillance if their alarming has been turned off for any arrhythmia types. **WARNING** If a patient's ST analysis is turned off, the patient's ECG is not analyzed for ST-segment deviations. ST alerts or alarms are not generated, and ST information is not stored as graphical trends. The Acuity System can be configured to set ST analysis to Off as a default setting. For further information, see your system administrator.

Problem	Explanation
	WARNING In Acuity Systems that include an Arrhythmia option, a relearn function causes the system to learn a patient's normal ECG rhythm. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm. A relearn event can be initiated by a user, or by the system. System relearns are in response to these circumstances: •Patient connection •Lead change or failure •System restart During an arrhythmia relearn event, the system posts a RELEARN alert in the patient's Virtual Monitor and Waveform Window. Carefully observe a patient during an Acuity System learning period. During learning, the system detects only VFib and asystole arrhythmias. After a relearn event, "Relearn" and "Learning Done" event markers (▼) appear in most of the patient's review windows and some printouts. After relearn, carefully evaluate the new reference ECG rhythm and the current ST segment for all active leads to ensure that the system learned an appropriate rhythm. For evaluation instructions, see "To respond to a RELEARN alert" on page 91. **WARNING** Minimize patient movement during a RELEARN, as movement creates noise during the reading. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm. Ensure that the patient remains still for 5 minutes after the RELEARN before allowing them to move.
When I'm monitoring a neonate, any buttons related to Arrhythmia Analysis and ST Analysis are grayed out.	The Arrhythmia Analysis and ST Analysis options are not intended for neonatal patients. When patient mode is set to Neonate, Arrhythmia Analysis and ST Analysis buttons are disabled.
A large number of irregular rhythm alarms are occurring.	You can adjust the minimum duration that an irregular rhythm must occur before the Acuity System alarms for a patient. In the Arrhythmia Alarms Setup window, under Options, click an arrow to specify up to 120 seconds, and then check the Irregular Limit box.

Printing

Table 18. Troubleshooting printing

Problem	Explanation
There is a delay in the Virtual Monitor or Waveform Window data display when a printout takes place. Is any data lost?	No data is lost.
In snapshots or alarm prints, sometimes four or five waveforms are printed, and sometimes three waveforms are printed.	Although a Virtual Monitor can show up to three waveforms at once, if additional waveforms are turned on for display, all are printed.
An alarm print or snapshot doesn't include a vital signs summary, even though an NIBP measurement was taken within the last eight hours.	When over three waveforms are printed on an alarm print or snapshot, there is no room left on the printout for a vital signs summary. If you prefer to receive a vital signs summary, turn off additional waveforms in the Virtual Monitor by clicking **MAIN MENU**, **MORE**, **WAVE SEL**, **NEXT** (if necessary), **CHANGE**.
I expected a printout to occur at the central station, but it did not occur. Or appears on the map at the central station area.	**Check for various causes** 1. Ensure that the printer is turned on and supplied with paper and toner. 2. Ensure that the printer's On Line light is illuminated. 3. Click or on the map at the central station location to open the Central Station Printers window. 4. If any print job has beside it, the job is corrupted due to a system configuration problem. (a) Click the job. (b) Click **Delete**, and then click **Delete Selection**. (c) Contact Welch Allyn Technical Services, if necessary. 5. If appears in the lower left corner of the window, click to open the Printers View. 6. Check for a printer with a problem message, and fix the problem. Printers with a stop-sign icon have been disabled. 7. If the printer was disabled, click the printer name, and then click **Enable**.
An alarm is suspended and an alarm print occurs. Then another vital sign alarm occurs for the patient, but no an alarm print occurs.	If an alarm is suspended and the Acuity System generates an alarm print, and then a new alarm occurs for the patient during the suspension period, a new alarm print does not occur.

Maintenance

Adjust Acuity System time

If your facility had an internet server available at the time of Acuity System installation, Welch Allyn encouraged you to synchronize the Acuity System clock to a network time protocol (NTP) server.

Welch Allyn recommends that you synchronize the Acuity System to an NTP server after Acuity System installation, in these circumstances:

- If an internet connection is lost
- If internet service becomes available

If your facility does not have an available internet server, manually adjust Acuity System time. Make adjustments periodically, according to your facility's policy, to maintain time accuracy.

You can adjust time forward or backwards, up to 20 minutes. Adjustments are made gradually to all Acuity Systems on a network and all patient monitors connected to the network.

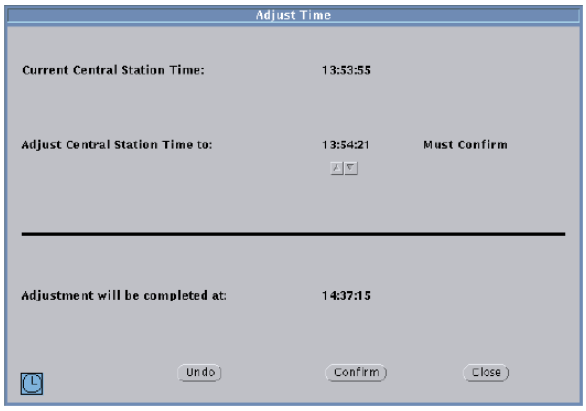
To adjust Acuity System time

1. In the lower left corner of the Acuity screen, click .
2. Type your system administrator password.

   The Administration window appears.
3. Click **Adjust Time**.

   The Adjust Time window appears.

   If the window informs you that your server is synchronized to an NTP server, close the window. You do not need to manually adjust system time.



4. Click the up or down arrow button until you see the desired time.
5. Click **Confirm**.

   The system time adjustment is made gradually.
6. Click **Close**.

Identify or change a monitor's network name (ESSID)

This section describes how to identify or change the extended service set identifier (ESSID) for each type of wireless patient monitor that can connect to an Acuity System wireless local area network (WLAN).

This information is useful if you want to do these things:

- Set up a Mobile Acuity LT System network.
- Move a patient monitor from one Acuity System network to another.
- Add a patient monitor to an Acuity System network.
- Especially among networked Acuity Systems, verify a monitor's ESSID.

An Acuity System's network name appears on a label in these places:

- For a Mobile Acuity LT System: on the system case
- For an Acuity System: on the CPU

Note Changing a monitor's network name causes the monitor to restart, erase all patient data and restore the monitor settings to default settings.

WARNING Do not attempt to change a monitor's network name unless you are a qualified biomedical service engineer or technician.

Confirm that the network name that you select matches the network name of the appropriate Acuity System. When you select a new ESSID, the patient monitor seeks a connection with any nearby Acuity System network with that same ESSID.

If you select a wrong network name, patient alarms and data for any patient connected to the monitor would occur at an unexpected Acuity Central Station.

Identify or change a Micropaq monitor network name

To identify a Micropaq monitor network name

1. Press ▼ to highlight **SYSTEM INFORMATION**, and then press ✓.

   The System Information menu appears.
2. Press ▼ to highlight **NETWORK STATUS**, and then press ✓.

   The Network Status screen appears.
3. Locate the Network Name in the list.
4. Press ✓ to exit.

To change a Micropaq monitor network name

1. Press ▼ repeatedly until **SERVICE MENU** is highlighted, and then press ✓.

   The Service menu appears.
2. In this sequence and not too rapidly, press and hold these keys:

   ▼, ▲ and ✓.

   An ARE YOU SURE? prompt appears.
3. Press ▼ to highlight **YES**, and then press ✓.

   A Network Name menu appears.
4. Press ▲ or ▼ to highlight the desired network name.
5. *Carefully* confirm that the highlighted name matches the appropriate Acuity System network name.
6. Press ✓.

   The Micropaq monitor turns off and on again, and then it attempts to connect to the Acuity System network.

Identify or change a Propaq LT monitor network name

To identify a Propaq LT monitor network name and prepare to change it (if desired)

1. Highlight **SpO2**, and then press ⊙.
2. Highlight **Setup**, and then press ⊙.

   The Setup menu appears.
3. Highlight **Service**, and then press ⊙.

   The Service menu appears.
4. Highlight **Radio**, and then press ⊙.

   The Radio menu appears, and Show Info is highlighted
5. Take one of these steps:

- If you want to change the network name: Continue below to "To proceed to change a Propaq LT monitor network name".
- If you do not want to change the network name:

  a. Press ⊙.

     The current network name is shown.

  b. Highlight **Exit,** and then press ⊙.

     You have completed the network name identification process.

To proceed to change a Propaq LT monitor network name

1. Highlight **NetName** and press ⊙.
2. Highlight the new network name.
3. *Carefully* confirm that the highlighted name matches the appropriate Acuity System network name.
4. Simultaneously press ◀ and ▶, and hold for one second.

   The Propaq LT monitor turns off and on again, and then it attempts to connect to the Acuity System network.

Identify or change a Wireless Propaq CS network name

To identify a wireless Propaq CS monitor network name and prepare to change it (if desired)

1. Touch , **SETUP**, **MORE**, **MORE**, **SERVICE**, **YES**, **MORE**, **MORE**, **RADIO**.

   The Network Status screen opens, and the NET NAME is listed.

2. Take one of these steps:

   - If you want to change the network name, continue below to "To proceed to change a wireless Propaq CS monitor network name".
   - If you do not want to change the network name, touch to return to the main menu.

To proceed to change a wireless Propaq CS monitor network name

1. Touch **CHANGE NET NAME**.

   The Change Net Name screen appears.

2. Touch **NEXT** repeatedly until the new network name is highlighted.

3. *Carefully* confirm that the highlighted name matches the appropriate Acuity System network name.

4. Touch **SELECT**.

   An ARE YOU SURE? confirmation screen appears.

5. Respond to the confirmation prompt.

   If you touch **YES**, the Propaq CS monitor turns off and on again, and then it attempts to connect to the Acuity System network.

Mobile Acuity LT Systems: Adjust localization parameters

If your Acuity System is a mobile (laptop computer) system, you can adjust these system parameters.

- Time zone
- Acuity System language
- Amended ID
- Micropaq monitor language
- Printout paper size
- EN1060 compliance
- Temperature units
- Enable or disable the optional parallel printer
- Set facility name (appears on printouts)
- Set unit name (appears in upper right corner of Acuity system display)
- Set printer ISO encoding
- Set barcode variables
- Set ECG filter

To adjust Mobile Acuity LT localization parameters

1. Hold down the key on your keyboard, move the cursor to the upper right corner of the screen, and press the right mouse button.
2. Click **Quit Application**, and then click **Confirm.**
3. Wait for the login screen to appear.

   The screen appears within one to two minutes.
4. Type "iupdate", and then press **Enter**.
5. Follow the prompts to make the desired changes.
6. Press **q** to quit.
7. Take one of these steps:

- If the system prompts you to reboot, take these steps:
  a. Choose **2** to quit.
  b. Reboot the system.

  The system reboots and starts the Acuity application.
- If the system prompts you to quit, take these steps:
  a. Choose **1** to quit.

     Wait for the login prompt.
  b. Type "acuity", and then press **Enter.**

     You are logged in to the Acuity application.

Power outages

An Acuity System can include an uninterruptible power supply (UPS). If the building power fails, the UPS provides power until backup generators can supply power.

Note UPS battery performance will degrade with use and time. Refer to the UPS manufacturer's directions for use for proper battery and product maintenance.

If your building does not have a backup generator, the UPS can supply at least three minutes of power while you turn off the Acuity System in an orderly manner. An orderly shutdown protects the equipment from damage.

To turn off the Acuity System

1. Notify staff members so that procedural changes in patient care can be put into place.

   It is not necessary to disconnect monitors from bedside network connectors.

2. On the Acuity System screen, move the pointer into the gray area of the upper right corner.

3. Open the System menu:

   - For an Acuity System: Hold down the ◆ key on your keyboard, and press the right trackball or mouse key.
   - For a Mobile Acuity LT System: Hold down the key on your laptop computer keyboard, and press the right mouse key.

   The System menu appears in the upper right corner of the screen.

4. Click **Shutdown Workstation**.

   A confirmation prompt appears.

5. Click **Confirm**.

6. Wait a few minutes for the computer to turn off.

7. Turn off power to these system components:

   Central Station display(s)
   Acuity System laser printer(s)
   Terminal servers
   Uninterruptible power supplies

Caution Do not simply turn off power to the Acuity Central Station. An orderly shutdown allows proper storage of patient information.

WARNING If normal central processing unit (CPU) operation is interrupted (for example, during CPU maintenance, scheduled and unscheduled reboots, power loss or a high-availability (HA) CPU switchover period), central station monitoring and analysis temporarily stop.

The Acuity System cannot collect patient review data during the interruption period. That data becomes permanently unavailable.

Auto-reboots and HA CPU switchovers occur infrequently, but poor environmental conditions and failure to perform preventative maintenance can increase frequency of occurrence.

Whenever an interruption in Acuity System CPU operation occurs, please contact Welch Allyn Technical Service soon to ensure that your entire system has returned to normal operating condition and that it does not require further service.

To turn on the Acuity System

1. Turn on the power to these components, in this sequence:
   a. Uninterruptible power supplies (one at the central station and one or more in the equipment room)
   b. Acuity System laser printer(s)
   c. Terminal server (located in the equipment room)
   d. Acuity Central Station display(s)
   e. Acuity Central Station computer

   The computer power-up process takes several minutes, and several system messages appear on the screen. The Acuity System logs in and starts up the Acuity System screen. The map appears and all connected monitors' map icons show Unconfirmed Patient ID status or Alarm(s) Off status.
2. For each patient, take these steps:
   a. Verify patient information, and then click **YES**.
   b. Check patient alarm limits.

WARNING In Acuity Systems that include an Arrhythmia option, a relearn function causes the system to learn a patient's normal ECG rhythm. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as a normal. Thereafter, rhythms of this type might not trigger an alarm.

A relearn event can be initiated by a user or by the system. System relearns are in response to these circumstances:

- Patient connection
- Lead change or failure
- System restart

During an arrhythmia relearn event, the system posts a RELEARN alert in the patient's Virtual Monitor and Waveform Window. Carefully observe a patient during an Acuity System learning period. During learning, the system detects only VFib and asystole arrhythmias.

After a relearn event, "Relearn" and "Learning Done" event markers (▼) appear in most of the patient's review windows and some printouts. After relearn, carefully evaluate the new ECG rhythm and the current ST segment for all active leads to ensure that the system learned an appropriate rhythm. For evaluation instructions, see "To respond to a RELEARN alert" on page 91.

WARNING Minimize patient movement during a RELEARN, as movement creates noise during the reading. If the system learns an abnormal rhythm or learns a rhythm during noise, it designates the learned rhythm as normal. Thereafter, rhythms of this type might not trigger an alarm. Ensure that the patient remains still for 5 minutes after the RELEARN before allowing them to move.

Periodically check equipment for safety

The Acuity System network cable

Regularly inspect network cables, and replace them once every 12 months. Discard all cables that have been in use for a year or longer.

To inspect Acuity System network cables

- Inspect for damaged connectors and intact connector securing clips.
- If a cable's connector does not "click" into place when you connect it to a patient monitor and to the bedside network connector, replace the cable with a new one.

System components

Perform these inspections and tests at least every 24 months.

To inspect and test Acuity System components

- Verify that acoustic and visual alarms and alerts are functioning properly.
- Ensure that the redundant protective earth connections (green wires) are in place for Acuity System components.
- Inspect fuses located near the AC input on the back of Acuity Central Station components—verify compliance with the current specifications indicated on labels near the fuses.
- Inspect all Acuity System equipment for mechanical and functional damage.
- Vacuum the intake vent and behind the computer; inspect equipment for dust accumulation.

Equipment disposal

Acuity Central Monitoring System

Do not dispose of this product as unsorted municipal waste. Prepare this product for reuse or separate collection as specified by Directive 2002/96/EC of the European Parliament and the Council of the European Union on Waste Electronic and Electrical Equipment (WEEE). If this product is contaminated, this directive does not apply.

For more specific disposal information, see www.welchallyn.com/weee, or contact Welch Allyn Customer Service at +44 207 365 6780.

Uninterruptible power supply (UPS) battery

When the UPS battery has reached the end of its life, you can return it to the UPS manufacturer for service or recycling.

Do not simply dispose of UPS batteries: always recycle or dispose of them in the manner recommended by the UPS manufacturer.

11 Specifications

Monitor/Acuity System compatibility

Table 19. Patient monitor/Acuity System compatibility

Patient monitor	Acuity System
Micropaq monitor, 1.3 software or higher	Acuity System software version 8.1x
Propaq CS monitor, 3.0 software or higher	
Propaq LT monitor 1.00.01 software or higher	
Propaq Encore monitor, 1.2 software or higher	
Welch Allyn 1500 Patient Monitor, 1.1 software	

General system monitoring capabilities

Table 20. General Acuity System monitoring capabilities

Feature	Specification
Maximum number of patients for which data is displayed simultaneously	First Acuity System screen and Mobile Acuity LT Systems: 12 Acuity Systems with multiple screens: 16 each additional screen, maximum of three additional screens.

Table 21. Networked Acuity System capabilities

Function	Primary Acuity System	Auto-Open Secondary (AOS) Acuity Central Station	Patient List Review (PLR) Acuity Central Station
	Direct connection between patient's monitor and Acuity System	Duplicate Acuity Central Station that derives information from the primary Acuity System.	Duplicate Acuity Central Station that derives information from the primary Acuity System. Ability to select, from the Patient List, which patients are viewed.
View Waveform Windows and Virtual Monitors.	Y	Y	Y
View real-time vital signs.	Y	Y	Y
Print records and specify auto-printing for a patient.	Y	Y	Y
Review graphical trends, tabular trends/ events, waveforms, OxyCRG information, arrhythmia events and ST analysis information.	Y	Y	Y
Coordinate central station printers and print jobs.	Y	Y	Y
Print a patient summary from the patient list.	Y	Y	Y
Open a Waveform Window by clicking a map icon	Y	Y	Y
Admit and readmit patients.	Y	Y	N
Transfer patients.	Y	Y	N
Discharge patients.	Y	Y	N
Enter and change patient information and add a patient note.	Y	Y	N
Change alarm limits and settings.	Y	Y	N
Set up Arrhythmia Analysis and ST Analysis.	Y	Y	N
Waveform Windows and Virtual Monitors auto-open on alarm.	Y	Y	N
Suspend alarms or alerts.	Y	Y	N
High Availability (HA) Paired Systems supported (For details, see "Flexible patient access (FPA) using virtual network computing (VNC)" on page 13).	Y	N	N

Acuity System heart rate

Table 22. Acuity System heart rate calculation

Acuity System configuration	Method of HR calculation
Acuity System with Arrhythmia Analysis module	Acuity Central Station display is determined by Acuity System Arrhythmia Analysis software, and patient monitor display is determined by patient monitor. Patient monitor HR can be different from Central HR. If a patient monitor alarms for HR and Central does not alarm, Acuity Central Stations with software versions 6.31+ can receive a Check HR/PR equipment alert. The time delay for this alert is configurable by the system administrator. Acuity System Arrhythmia Analysis software calculation: The beat-to-beat heart rate (HR) value is calculated as follows: HR = 60000/actual RR (bpm). Actual RR = time between last detected QRS complex and previously detected QRS complex (ms). The average heart rate is calculated on the basis of the mean RR interval of the last 16 beats, unless the heart rate calculated using the last four beats is less than or equal to 48, then this rate is used.
Acuity System without Arrhythmia Analysis option	Acuity Central Station and patient monitor displays are determined by the patient monitor. Time delay between patient monitor HR alarm and Acuity Central Station display of alarm: 10 s default, configurable Propaq LT and Micropaq monitors calculation: determined by monitor Propaq CS and Encore monitors calculation: Heart rate = 60 / latest average interval in seconds For higher heart rates, latest average interval = 7/8 of previous average interval + 1/8 of latest interval For lower heart rates, latest average interval = 3/4 (previous average interval) + 1/4 latest interval. Transition rates for choice of formula include hysteresis and are 70 and 80 beats per minute.

Table 23. Acuity System heart rate trending

Heart rate trends	Heart rate information is available in the trend data, which can be viewed on the display or printed. The operator can inspect the trend data to see the lowest, highest, and median (averaged) heart rates. Trend data also includes the total beats per range of time.

Acuity System pacemaker detection

Table 24. Pacemaker detection with the Acuity System Arrhythmia Analysis module

Monitor	Characteristic	Specification
Micropaq	Acuity System Virtual Monitor	Pacer indicator shown on screen if PACER display turned ON; pacer spike always shown if of sufficient amplitude.
	Pacer Pulse Detection/ Rejection	Pacer detection range (i.e., shows the dashed vertical marker) for ±3 mV to ±700 mV @ 0.1 ms width, ±2 mV to ±700 mV @ 0.2 to 2 ms pulse width in electrically quiet environment. Thresholds adjust to reject repetitive ambient noise. Pacer detector influences QRS picking even while pacer indication is disabled. Does not count as heartbeats approximately 95% of pacemaker pulses within pacer detection range[a], with or without AAMI (EC13-1992) tails of 4, 25, 50, 75 or 100 ms decay time constant, whose tail amplitudes are up to 25%, 2 mV maximum, whether ventricular only, or A-V sequential pulses (150 and 250 ms separation), all per AAMI 1992 tests 3.1.4.1 and 3.1.4.2.
Propaq CS Propaq Encore	Acuity System Virtual Monitor	Pacer indicator shown on screen if PACER display turned ON; pacer spike always shown if of sufficient amplitude.
	Pacer Pulse Detection/ Rejection	Pacer detection range (i.e., shows the dashed vertical marker) for 0.1 ms pulses is ±3 mV to ±700 mV, and drops linearly to ±2 mV to ±700 mV for 0.2 to 2 ms pulses. Pacer detector influences QRS picking even while pacer indication is disabled. Does not count as heartbeats approximately 95% of pacemaker pulses that are within pacer detection range[a] with or without AAMI (EC13 1992) tails of 4, 25, or 50, 75 or 100 ms decay time constant, whose tail amplitudes are 2.5% or 25%, 2 mV maximum, whether ventricular only, or A-V sequential pulses, all per AAMI 1992 tests 3.1.4.1 and 3.1.4.2
Propaq LT	Acuity System Virtual Monitor	Pacer indicator shown on screen if PACER display turned ON; pacer spike always shown if of sufficient amplitude.
	Pacer Pulse Detection/ Rejection	Pacer detection range= ±3.2 mV to ±700 mV @ 0.1 ms width, ±2 mV to ±700 mV @ 0.2 to 2 ms pulse width, all with or without overshoot, in electrically quiet environment. Thresholds adjust to reject repetitive ambient noise. Pacer detector influences QRS picking even while pacer display indication is disabled. Does not count as heartbeats approximately 95% of pacemaker pulses within pacer pulse detection range[a], with or without AAMI (EC13 2002) tails of 4, 8, 15, 25, 50, 75, or 100 ms decay time constant, whose tail amplitudes meet either EC13's method A or method B specifications, whether ventricular only, or A-V sequential pulses (150 and 250 ms separation), all per AAMI tests 4.1.4.1 and 4.1.4.2

a. Rejects method B overshoots for [pulse width] x [pulse amplitude] < 3×10^{-4} V-sec.

Acuity System alarm and alert indications

Table 25. General Acuity System alarm and alert indications

Feature	Specification
Numeric update time after Acuity System receives alarm indication from a patient's monitor	Within 1 s
Acuity Central Station tone volume	Installation choice (hourly settings)
Audible alarm or alert tone delay time to patient's monitor	10 s (configurable up to four minutes, 15 seconds)
Audible alarm or alert tone suspension time and activation	90 s, activated individually for each patient
Note, frequency range and pause length for different types of tones	Monitor equipment alerts: 1 A_4 @ 440.0 Hz, pause 2.45 s Low-level alarms: 3 E_5 @ 660.0 Hz (1 s apart), pause 1.25 s Medium-level alarms: 1 A_5 @ 880.0 Hz coupled with 1 $C\#_5$ @ 554.0 Hz, pause 0.5 s High-level alarms: 3 A_5 @ 880.0 Hz, pause 5/6 s Lethal alarms: 4 A_5 @880.0 Hz with harmonics, pause 0.8 s
Latched alarms	Visual latching: When feature enabled, the most recent, highest-priority arrhythmia alarm latches in the Waveform Window, even after alarm condition ceases. Can be configured to apply to lethal/high-level or lethal/high-level/ medium-level arrhythmia alarms. Audible latching: Lethal arrhythmia events can be configured to also latch audibly. Audio tone latching default is off.

Table 26. Alarm and alert indications at the Acuity Central Station

	Alarms (red)	Monitor equipment alerts (yellow)	System-wide equipment alerts (yellow)	Patient information alerts (yellow)
Duration	Indications remain until condition is cleared or alarm is turned off. If latched alarm capability is enabled, lethal and high-level arrhythmia alarms (and medium-level arrhythmia alarms if so configured) persist in Waveform Windows until cleared at Central.	Indications remain until the condition is cleared or the alert is acknowledged (disabled) at the patient monitor (some alerts do not allow acknowledgement). Certain wireless alerts can be **RESET** at the Acuity Central Station.	Indications remain until condition is cleared except Disk Failure equipment alert is displayed for two minutes, four times an hour.	

Table 26. Alarm and alert indications at the Acuity Central Station (continued)

	Alarms (red)	Monitor equipment alerts (yellow)	System-wide equipment alerts (yellow)	Patient information alerts (yellow)
Message window (At top of Acuity Central Station screen) Specific message matches hallway message panel message—(panels are optional)	✔	✔	✔	
Map icon at patient location (matches Virtual Monitor and Waveform Window icon)	✔	✔		✔
Map icon at Acuity Central Station location			✔	
Orange Line on map When you bring your pointer into a Virtual Monitor or Waveform Window, an orange line in the map shows the shortest route to your patient's bedside from the Acuity Central Station (except for patients with map icons in the wireless areas of the map).	✔	✔		✔
Virtual Monitor (icon border color change, border message)	✔	✔		✔
Waveform Window (icon, border color change, border message: these match the Virtual Monitor)	✔	✔		✔
Utility windows (Associated with Virtual Monitors) Border color change[a] (matches corresponding Virtual Monitor and Waveform Window)	✔	✔		✔

a. Any review windows opened via the Patient List window have a blue border. If an alarm or alert occurs for that patient, the border remains blue, but the patient's Virtual Monitor and Waveform Window borders turn yellow or red, as usual.

Table 27. Alarm and alert indications at the Acuity System Virtual Monitor

	Alarms (red)	**Monitor equipment alerts (yellow)**	**System-wide equipment alerts (yellow)**	**Patient information alerts (yellow)**
Display Priority	Virtual Monitors in alarm "bump" those not in alarm, when necessary.	Virtual Monitors in alert state *are not* automatically displayed.	No displays in Virtual Monitor.	Virtual Monitors in alert state *are not* automatically displayed.
Indications	Violating vital sign's numeric is highlighted. +++ means measured values fall above the monitor's range, --- means they fall below, and ??? means they could not be measured. Specific message appears in border. Status icon.	Equipment Alert status window appears in Virtual Monitor. For most, a specific message appears in border. Status icon.	No indications in Virtual Monitor.	Specific message in border. Status icon.
Message Priority	Displays highest level message for each patient.	If more than one monitor equipment alert occurs for one monitor at once, a "Multiple" message appears in border.	No messages in Virtual Monitor.	Alarms and monitor equipment alerts take priority over low-level alerts.

Table 28. Alarm and alert indications at the Waveform Window

	Alarms (red)	**Monitor equipment alerts (yellow)**	**System-wide equipment alerts (yellow)**	**Patient information alerts (yellow)**
Display Priority	Acuity System automatically displays Waveform Windows in alarm state in all views containing Waveform Windows. Waveform Windows in alarm "bump" those *not* in alarm, when necessary.	Waveform Windows in alert state *are not* automatically displayed.	No displays in Waveform Window.	Waveform Windows in alert state *are not* automatically displayed.
Indications	Violating vital sign's numeric is highlighted. +++ means measured values fall above the monitor's range, --- means they fall below, and ??? means they could not be measured. Specific message appears in border. Status icon. If visual latched alarm capability is enabled, lethal and high-level arrhythmia alarms (and medium-level arrhythmia alarms if so configured) persist in Waveform Windows until cleared at Central.	For most, specific message appears in border. Status icon.	No messages in Waveform Window.	Specific message appears in border. Status icon.
Message Priority	Displays highest priority message for each patient.	If more than one monitor equipment alert occurs for one monitor at once, a "Multiple" message appears in border.	No messages in Waveform Window.	Alarms and monitor equipment alerts take priority over low-level alerts.

Table 29. Alarm and alert indications at (optional) hallway message panels and in message window at the top of the Acuity Central Station screen

<table>
<tr><th></th><th>Alarms
(red)</th><th>Monitor equipment alerts
(yellow)</th><th>System-wide equipment alerts
(yellow)</th><th>Patient information alerts
(yellow)</th></tr>
<tr><td>Message</td><td>“RM number” followed by alarm-type and violating vital sign.</td><td colspan="2">Specific messages for specific alerts.</td><td rowspan="3">No messages</td></tr>
<tr><td>Priority</td><td colspan="2">Only highest priority message for each patient/monitor is displayed. Life threatening alarms take priority over all other alarms.

If more than one patient has an alarm or alert at one time, the messages rotate in and out.

New alarms appear before new alerts.</td><td>Messages appear only when no alarms or monitor equipment alerts are occurring.</td></tr>
<tr><td>Duration</td><td colspan="3">Messages appear for at least five seconds, and then other active messages reappear, one-by-one. The Disk Failure equipment alert is displayed for two minutes four times an hour.</td></tr>
</table>

Electromagnetic standards compliance

The Acuity Central Monitoring System complies with all applicable and required standards for electromagnetic interference.

- It does not normally affect nearby equipment and devices.
- It is not normally affected by nearby equipment and devices.
- It is safe to operate the Acuity System in the presence of high-frequency surgical equipment.
- However, it is good practice to avoid using the Acuity System in extremely close proximity to other equipment.

Guidance and Manufacturer's Declaration—Electromagnetic Emissions

The Acuity System is intended for use in the electromagnetic environment specified below. The customer or the user of the Acuity System should assure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic Environment—Guidance
RF emissions CISPR 11	Group 1	The Acuity System uses RF energy only for its internal function.Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The Acuity System is suitable for use in all establishments, other than domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

Guidance and Manufacturer's Declaration—Electromagnetic Immunity

The Acuity System is intended for use in the electromagnetic environment specified below. The customer or the user of the Acuity System should assure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment—Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions, and voltage variations on power-supply input lines IEC 61000-4-11	<5% U_t (>95% dip in U_t) for 0.5 cycle 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec	<5% U_t (>95% dip in U_t) for 0.5 cycle 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Acuity System requires continued operation during power mains interruption, it is recommended that the monitor be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Note	U_t is the AC mains voltage prior to application of the test level.		

Guidance and Manufacturer's Declaration—Electromagnetic Immunity

The Acuity System is intended for use in the electromagnetic environment specified below. The customer or the user of the Acuity System should assure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment—Guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the Acuity System, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
			Recommended Separation Distance
Conducted RF IEC 61000-4-6	3 V_{rms} 150 kHz to 80 MHz	3 V_{rms}	$d = 1.2\ \sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1.2\ \sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\ \sqrt{P}$ 800 MHz to 2.5 GHz where **P** is the maximum output power rating of the transmitter in watts according to the transmitter manufacturer and **d** is the recommended separation distance in meters. Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey[a], should be less than the compliance level in each frequency range[b]. Interference might occur in the vicinity of equipment marked with this symbol:
Note 1	At 80 MHz and 800 MHz, the higher frequency range applies.		
Note 2	These guidelines might not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.		
a	Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Acuity System is used exceeds the applicable RF compliance level above, the Acuity System should be observed to verify normal operation. If abnormal performance is observed, additional measures might be necessary, such as reorienting or relocating the Acuity System.		
b	Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.		

Recommended Separation Distances Between Portable and Mobile RF Communications Equipment and the Acuity System

The Acuity System is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Acuity System can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Acuity System as recommended below, according to the maximum output power of the communications equipment.

Rated Maximum Output Power of Transmitter W	**Separation Distance According to Frequency of Transmitter m**		
	150 kHz to 80 MHz $d = 1.2\ \sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2\ \sqrt{P}$	**800 MHz to 2.5 GHz** $d = 2.3\ \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (w) according to the transmitter manufacturer.

Note 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

Note 2 These guidelines might not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Acuity System customizable defaults and factory defaults

Acuity System default settings appear in Acuity System windows upon patient monitor connection, when a patient's window is first opened.

There are two types of Acuity System default settings:

- Customizable default settings: Settings that can be customized to match your clinical workflow model, at the point of installation.
- Factory default settings: Settings that are shipped from the factory. These settings cannot be changed.

Hardware specifications for Acuity System components are listed in the manufacturers' manuals.

Specifications published in this manual are subject to change.

Central Station windows

Table 30. Acuity Central Station Printer window

Features	Customizable default	Factory default
Printing order of print requests		1. Print Next 2. Alarm Prints 3. All other printout requests, in the order received
Maximum allowable number of print requests in a print queue	40	
Printout deletion order		When the number of print requests in the queue exceeds the default, the deletion order from the queue is: **1st deletes** the oldest print requests (other than alarm or Print Next) in a group of printout requests for a patient **Then deletes** the oldest alarm prints in a group of printing requests for a patient **Then deletes** the oldest "Print Next" requests in a group of printing requests for a patient

Table 31. Patient List window

Features	Factory default
Sort order	ID, currently monitored patients at top
Length of time review information remains accessible	24 to 96 hours after patient discharge from Acuity System monitoring, depending on Full Disclosure option

Virtual Monitor and Waveform Window

Table 32. Virtual Monitor

Features	Customizable default	Factory default
Virtual Monitor auto open		In map view and full screen review view: • Upon patient's monitor connection to Acuity System if empty window • Upon alarm if open space is available OR replaces a non-alarming Virtual Monitor
Patient mode (listed in patient monitor Setup status window)	Micropaq monitor: adult	Propaq LT, CS and Encore monitors: Adult, pediatric or neonate mode, depending upon setting at patient monitor
Display settings		Acuity System utilizes monitor factory default settings. For further information, see the monitor directions for use.
Lead selections	Micropaq and Propaq LT monitors: 5-wire cable: ECG1 LEAD is Lead II ECG2 LEAD is Lead V RESP LEAD is Lead III 3-wire cable: ECG1 LEAD is Lead II Propaq CS and Propaq Encore monitors: 5-wire cable: ECG1 LEAD is Lead II ECG2 LEAD is Lead V 3-wire cable: ECG1 LEAD is Lead II Welch Allyn 1500 Patient Monitor: 10-wire cable: ECG1 LEAD is Lead II ECG2 LEAD is Lead V 5-wire cable: ECG1 LEAD is Lead II ECG2 LEAD is Lead V 3-wire cable: ECG1 LEAD is Lead II	
Number of waveforms displayed simultaneously		Up to three
Display priority of waveforms		All waveforms on (ECG always displayed if monitored): 1. ECG 1 3. ECG 3 5. CO_2 7. SpO_2 2. ECG 2 4.P1 and P2 6. RESP 8. NIBP
Number of vital sign numerics displayed simultaneously		Eight (if six or more are monitored at once, Temperature and NIBP values alternate in the same space) If CO_2 active and turned on at the patient monitor, BR numerics are shown; second choice is RR numerics, when impedance pneumography is active

Table 32. Virtual Monitor

Features	Customizable default	Factory default
Heart rate (HR)		For patients being monitored for arrhythmias, the HR value is derived from the arrhythmia library instead of from the patient monitor.

Table 33. Waveform Window

Features	Factory default
Waveform Window auto open	In waveforms views: 1. Upon monitor connection to Acuity System if empty window 2. Upon alarm if open space is available OR replaces a non-alarming Waveform Window
Number of waveforms displayed simultaneously	Up to two
Display priority of waveforms	1. ECG 3. P2 5. RESP 7. NIBP 2. P1 4. CO_2 6. SpO_2
Number of vital sign numerics displayed	Up to four. If four or more monitored at once, the third and fourth alternate in the same zone; others appear if they alarm
Display priority of numerics	1. HR/PR 4. P1 7. RR 2. SpO_2 5. P2 8. NIBP 3. Alarming numerics 6. CO_2 and BR 9. Temperature
Heart rate (HR)	For patients being monitored for arrhythmias, the HR value is derived from the arrhythmia library instead of from the patient monitor.

Setup windows

Table 34. Setup window—Alarms

Features	Customizable default	Factory default
Display priority of vital signs		Up to three vital signs, in this order of priority: 1. Vital signs in alarm 2. Active vital signs (in the order listed in window)
Alarm limits		Presets values
Presets values	Micropaq monitor: HR: 50 to 120 bpm SpO_2: 90% to 100%	For all monitors except the Micropaq monitor: Presets are the factory default alarm limits of the patient monitor, based on patient mode. For further information, see monitor directions for use.
Stat Set values		Acuity Systems execute the Propaq Encore monitor STAT SET function. For further information, see *Propaq Encore directions for use*.
Auto Set values		Acuity Systems execute the Propaq Encore monitor STAT SET function. For further information, see *Propaq Encore directions for use*.

Table 35. Setup window—Arrhythmia Alarms

Features	Customizable default	Factory default
Alarm level	Medium for Pause, off for all other arrhythmia types except VFib, asystole and V-Tach	Lethal for VFib, asystole, V-Tach
Arrhythmia alarm limits		Presets values
Presets values	V-Tach, 125; PVC run, 6; PVC/min, 30; Tachycardia, 180; Bradycardia, 45; Irregular Limit, 45	
Print on alarm	Off for all	
Options: Irregular Limit Single ECG (active with 5-wire cable only) Pacer Display Analyze Pacers	 Off Off	 Off Off
PaceMaker NonCapture		Disabled
Leads used for arrhythmia analysis		Welch Allyn 1500 Patient Monitor, Micropaq, and Propaq LT monitor 5-wire cables: • Arrhythmia channel 0 uses lead II. • Arrhythmia channel 1 uses lead V. • Arrhythmia channel 2 uses lead III. Propaq Encore, Propaq CS: The leads that the user selects for ECG1 and ECG2 are used for arrhythmia analysis.
Arrhythmia alarms for paced patients		Arrhythmia alarms depend on Acuity System pacemaker detection vs. monitor pacemaker detection.

Table 35. Setup window—Arrhythmia Alarms

Features	Customizable default	Factory default
Clicking Arr/ST Relearn or RELEARN Clicking Analyze Pacers Clicking Single ECG Note: A RELEARN button instead of an Arr/ST Relearn button indicates that the system does not include ST Analysis or the ST Analysis Setup window.		System relearns the patient's normal ECG rhythm and uses the relearned rhythm as a guideline to identify arrhythmia events (arrhythmia relearn) and to analyze deviation of the ECG ST-segment offset (ST relearn). In Virtual Monitor and Waveform Window: A visual RELEARN alert occurs, HR is taken from the patient monitor instead of from the arrhythmia software, and real-time waveforms display as usual. In ST Analysis Setup window: The waveform slice displays NO VALID BEATS, and the Acuity System can take up to 30 seconds to update the waveform. Relearn and Learning Done event markers (▼) appear in most review windows and some printouts.

Table 36. Setup window—ST Analysis

Features	Customizable default	Factory default
ST Analysis	On	
ST analysis is disabled for these monitors		• Patient monitors in the Neonate mode • Virtual Monitors with Analyze Pacers on in the Arrhythmia Alarms Setup window.
Type of beats for which analysis is performed		Non-ventricular beats
Offset to measurement (ms or mV)	Auto, ms The Auto setting allows the Acuity System to select the offset based on the heart rate: If the sustained heart rate is greater than 120 beats per minute, Acuity System chooses 60 ms; at 120 beats per minute or less, Acuity System chooses 80 ms	
Print on alarm	Off	
Alarm limits	±1.0 mm	
Alarm level	Low	ST alarms have a priority below arrhythmia alarms set to the same level. Arrhythmia alarms are displayed before ST alarms.
Selected leads for ST analysis		Micropaq and Propaq LT monitors: • 5-wire ECG cable: all seven leads. • 3-wire ECG cable: The lead selected for ECG1 displays in the Virtual Monitor. Maximum of one active lead at one time. Propaq Encore and Propaq CS monitors: • 5-wire ECG cable: The leads selected for ECG1 and ECG2 display in the Virtual Monitor • 3-wire ECG cable: The lead selected for ECG1 displays in the Virtual Monitor Welch Allyn 1500 Patient Monitor • 10-wire ECG cable: The leads selected for ECG1 and ECG2 display in the Virtual Monitor • 5-wire ECG cable: The leads selected for ECG1 and ECG2 display in the Virtual Monitor • 3-wire ECG cable: The lead selected for ECG1 displays in the Virtual Monitor Depending upon the monitor, some of these leads cannot be deselected.
Trending		ST-segment shifts are recorded in continuous trend data every second. The user can inspect trend data (in Graphical Trends Review window and trend printouts) to see the duration and elevation or depression for each episode for any period recorded. The operator also can inspect a summary of ST-segment shift data within tabular trend prints.

Table 36. Setup window—ST Analysis

Features	Customizable default	Factory default
Presets values	Alarm limits: ±1.0 mm Alarm level: Low Measurement Offset: Auto Print on Alarm: Off	
Clicking the ST RELEARN button		System relearns a patient's normal ECG rhythm and uses the relearned rhythm as a guideline to analyze deviation of the ECG ST-segment offset. Establishes a new ST reference beat without changing the normal ECG rhythm used for arrhythmia analysis. In ST Analysis Setup window: The waveform slice displays NO VALID BEATS, and the Acuity System can take up to 30 seconds to update the waveform. Relearn and Learning Done event markers (▼) appear in most review windows and some printouts.

Table 37. Setup window—Printouts

Features	Customizable default	Factory default
Vital signs that initiate central alarm print	HR	
Central auto print time interval	Off	
Vital signs that initiate Central OxyCRG alarm print	Off	
Priority of vital signs alarming simultaneously for alarm prints		Order listed in window

Table 38. Setup window—Waveform-Window

Features	Customizable default	Factory default
Number of vital signs checked at once	Up to two, but only one ECG at once	
Priority order of displayed vital sign boxes		1. ECG 1 2. P1 3. P2 4. CO_2 5. RESP 6. SpO_2 7. NIBP

Review windows

Table 39. Review window—Graphical Trends

Features	Customizable default	Factory default
Frequency of trend data sampling and storage by Acuity System		Sampled and stored once per second
Frequency of patient monitor data storage and transfer to Acuity System		Data is stored at the monitor every two minutes (one minute for Propaq LT) and then transferred to Acuity System
Time delay from Virtual Monitor display to Graphical Trends Review window display		Less than one minute, updated continuously
Display priority of trends		Up to five vital signs (ten in the full-screen review view) that have been active within last 24 hours, in following order of priority: 1. HR/PR 2. Arrhythmia Analysis 3. PVCs/min 4. ST Analysis 5. P1 6. P2 7. CO_2 8. RR/BR 9. SpO_2 10. NIBP 11. Temp
Time span	Eight hours	
Cursor bar position		The most recent time monitored appears at the right edge of the window, or if another review window was viewed first, the period is centered around the cursor bar position in the first-viewed window
HR/PR, RR/BR, P1/P2 and CO_2 labels to the right of the Graphical Trend Display		Reflect labels selected at the monitor during the current time position of the cursor bar.
Presets values		P2 is 0 mmHg to 50 mmHg, all others similar to monitor factory “Trend Graphs” values. For further information, see the monitor directions for use.
Blue cursor bar shows		Vital sign numerics and event types. Event markers are arrhythmia types, Arrhythmia and ST Relearn or Learning Done and snapshot print.
24-hour (or up to 96-hour) time line indicates patient and equipment state		Time line color matches icon color at all points in time
Printouts		Graph, Table, Summary

Table 40. Review window—Tabular Trends/Events

Features	Factory default
Frequency of trend data sampling and storage by Acuity System	Sampled and stored once per second
List type	Both
Tabular interval	15 minutes
Vital-sign boxes that are checked	None
Acuity System screen views that support this window	Full-screen and half-screen views
Number of waveforms viewed simultaneously	Half-screen view: 1 Full-screen view: 2
24-hour (or up to 96-hour) time line indicates patient and equipment state	Time line color matches icon color at all points in time
Printouts	Tabular Trends/Events
Data	Median value over the last minute Trends downloaded from the patient monitor are italicized Trends corresponding to events are bold with bell icon
ECG beat labels	Normal (●) and ventricular (V) If Acuity System includes Arrhythmia Analysis option, beat labels appear.

Table 41. Review window—Waveforms

Features	Factory default
Display priority of waveforms	Up to five (ten in the full-screen review view) monitored within the last 24 hours in following order of priority: 1. ECG (in the order listed in ECG specification) 2. Arrhythmia 3. P1 4. P2 5. CO_2 6. RESP 7. SpO_2
Period displayed	25 mm/s; period depends on sweep speed The most recent seconds monitored appear at the right side of the window, or if another review window was viewed first, the period is centered around the cursor bar position in the first-viewed review window.
ECG lead, RESP lead and CO_2 labels to the right of the waveform display	Reflect labels selected at the monitor during the current time position of the cursor bar. Propaq LT monitor lead selections are independent from Acuity System lead selections.
Presets values	ECG scale, 1 mV Sweep speed 25 mm/s P1 range 30 mmHg to 180 mmHg P2 range 0 mmHg to 50 mmHg CO_2 range 0 mmHg to 60 mmHg SpO_2 scale 1x RESP scale 2x
Blue cursor bar shows	Event types. Event markers are arrhythmia types, Arrhythmia and ST Relearn or Learning Done and snapshot print.
ECG beat labels	Normal (●) and ventricular (V) If Acuity System includes Arrhythmia Analysis option, beat labels appear for waveforms displayed at sweep speeds between 6.25 mm/s and 50 mm/s
24-hour (or up to 96-hour) time line indicates patient or equipment state	Time line color matches icon color at all points in time
Printouts	Waveforms Custom All Leads

Table 42. Review window—Arrhythmia Events

Features	Factory default
Waveform display	1. Arrhythmia 2. ECG waveforms used at the time of arrhythmia analysis (one visible in Half Screen view, more visible in Full Screen view depending on space and monitor type).
Period displayed	25 mm/s; period depends on sweep speed The most recent seconds monitored appear at the right side of the window, or if another review window was viewed first, the period is centered around the cursor bar position in the first-viewed review window.
Presets values	ECG scale 1 mV Sweep speed 25 mm/s
Blue cursor bar shows	Event types. Event markers are arrhythmia types, Arrhythmia Relearn and ST Relearn or Learning Done and snapshot print.
ECG beat labels	Normal (●) and ventricular (V)
24-hour (or up to 96-hour) time line indicates patient and equipment state	Time line color matches icon color at all points in time
Number of deleted arrhythmias allowed before the Delete Selected button becomes disabled	1000 per patient
Acuity System screen views that support this window	Full-screen and half-screen views
Printouts	Waveforms Events

Table 43. Review window—OxyCRG

Features	Factory default
HR/PR and SpO_2 trend data	Graphed as lines connecting each successive data point; PR from NIBP source graphed as single values
Trend data transferred from the patient's monitor	Graphed as very small squares
CO_2 and respiration data	Displays as waveforms
Time span	Two minutes
CO_2 or RESP selected	If CO_2 readings were taken in last 24 hours, CO_2 is selected; if no CO_2 readings taken but RESP readings were taken, RESP is selected
Cursor bar position	At right edge of most recent period monitored, or if another review window was viewed first, the period is centered around the cursor bar position in the first-viewed review window.
HR/PR and CO_2 labels to the right of the Graphical Trend display	Reflects label selected at the monitor during the current time position of the cursor bar
Presets values	Trend scales similar to monitor factory "Trend Graphs" values. For further information, see the monitor directions for use. CO_2 range 0 mmHg to 60 mmHg RESP scale 2x
Blue cursor bar shows	Vital sign numerics
24-hour (or up to 96-hour) time line indicates patient and equipment state	Time line color matches icon color at all points in time
Printouts	Graph

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